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A Weekly Journal Devoted to the Machinery, Metal-Working and Foundry Trades, and Iron and Steel Manufacture.

VOLUME XXXVII CLEVELAND, OHIO, JANUARY 14, 1904 NUMBER 2

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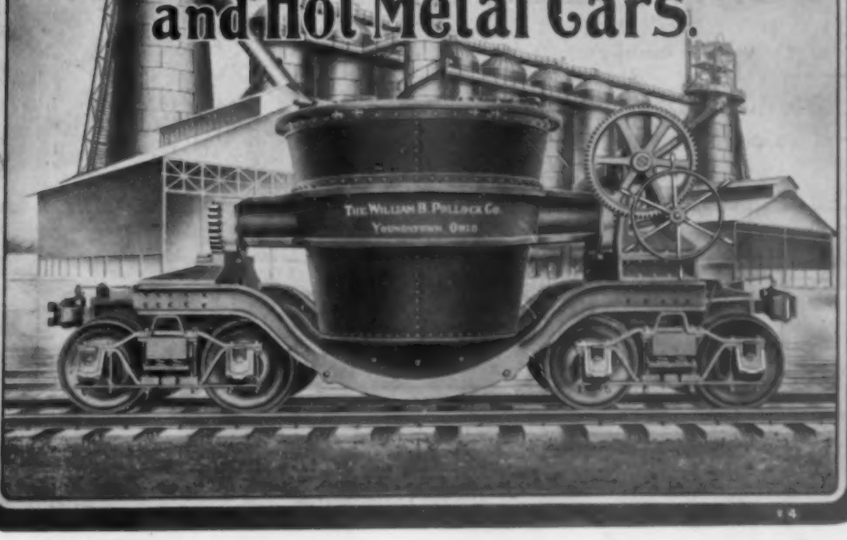

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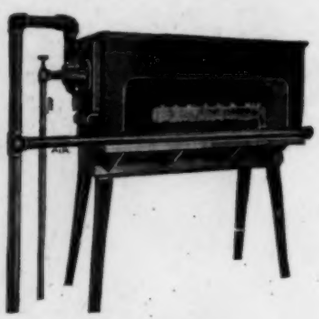

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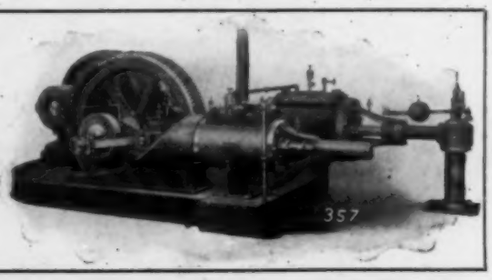

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THE IRON TRADE REVIEW

VOLUME XXXVII CLEVELAND, OHIO, JANUARY 14, 1904 NUMBER 2

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

A decided improvement in demand has appeared in the iron market in the past week. Not since midsummer of 1903 has there been such a week's buying in finished material, the developments in some lines being a surprise even to those in closest touch with the situation. There is a disposition in the trade to accept the change for just what it amounts to and to base on it no generalizations as to the business of the year or even of the quarter. It is one week's yield of better buying and as such is a marked contribution of hopefulness. What is to follow is of more moment than what has appeared, for the mills are in need of a good many such weeks. Realizing that improvement must have a week of beginning, producers are disposed to look for a further buying movement and for more weeks in which tonnage booked shall considerably exceed shipments. The starting up of idle plants would have furnished a noteworthy chapter of improvement; had not the market told the story. Blast furnaces in the East, West and Central West have resumed operations or have made ready for early resumption. The Carnegie Steel Co. will have 13 more stacks going by the end of the week than were active Jan. 1, and the resumptions elsewhere will quickly bring the added pig iron production up to a yearly rate of fully 2,250,000 tons. To supply these furnaces, 2,000 idle Connellsville coke ovens have been fired in the past week. Four steel plants of the leading interest, two in the Pittsburg district and two in the Shenango Valley, have started up or are on the point of starting. The production of pig iron by furnaces in the Central West connected with the movement for curtailing output reached low point Dec. 31, when out of the 156 furnaces in the movement 103 were idle. On that date the capacity of the idle furnaces was 65 percent of the total capacity, as against 57 percent at the close of November.

The most pronounced activity of the past week has been in bars and wire products. The heavier finished materials may not be correspondingly stimulated until the nearer approach of the out-door season. In the closing week of the old year and the first ten days of this year, it is estimated that the sales of wire products amounted to fully 100,000 tons, most of this tonnage being at concessions of $3 to $5 from the prices previously quoted. Demand of such proportions at this season reflects the good buying ability of the agricultural community and gives promise of a large spring business. On its heels has come an advance of $1 a ton from the low point and the leading producer and independent Pittsburg and Ashland, Ky., district interests are maintaining uniform quotations, this being the first agreement of the sort in many months. Another evidence of sound agricultural conditions is the good demand for bars in the week, Chicago reporting 20,000 tons closed. Manufacturers of steel bars met at Pittsburg Tuesday and reaffirmed prices, though an advance of $1 a ton had some supporters. Bar iron made a lower record in the past ten days, in the Central West, but is now about $1 a ton above the low point. The sheet trade shows sharper competition, with prices about $1 a ton lower in the week. In tin plates a feature is the large production in a season of light demand, and the accumulation of stocks is regarded as bearing upon impending wage changes.

Among the heavier products structural steel has given best promise in the week. American Bridge Co. business includes 7,000 tons for a D., L. & W. bridge and 1,200 tons for the C., B. & Q. There are pending also 7,000 tons for a Cambridge, Mass., bridge, 4,000 tons for a Montreal steel elevator and 9,000 tons for a New York printing and publishing building. Architects give a good account of building plans on their boards and large expectations in this line seem to be justified. The railroads have been buyers of machine tools since the opening of the year, but there is as yet no sign of promise in new steel rail business.

Pig iron has been fairly active in some centers and quiet in others. In the East two important consumers of foundry iron are in the market. Southern iron at $10 Birmingham for No. 2 is in little demand, and Northern furnaces are taking the business at figures below this basis, $12.75 and $13 at furnace being the common range. The committee of Southern producers reported at a meeting at Birmingham Tuesday which continued on Wednesday. At this writing there is only a remote probability of a new agreement.

PITTSBURG.

OFFICE OF *The Iron Trade Review*, 429 PARK BUILDING, Jan. 13.

In finished lines the iron and steel trade has improved decidedly in the past ten days, and the general situation is more encouraging than at any time in months. Specifications on old contracts, and new orders placed last week with the largest steel producers were heavier than during any similar period since last July, and this week thus far is showing a decided improvement over last. The largest tonnages booked are in iron and steel bars, while plates and structural material are not far behind. Wire nails and wire products are also in excellent demand, and an improvement in heavier lines is expected to follow the better condition in the lighter classes of material. Manufacturers of agricultural implements, vehicles, and diversified industries that consume only small tonnages of iron and steel are the most prominent buyers at the present time, and a growing demand from the small consumer points to an increased demand from the larger consumers in the near future.

Manufacturers of steel bars are especially well pleased over the present situation. At a meeting of the association held at the Union Club in this city yesterday a number of manufacturers were in favor of making an advance of $1 per ton, but this was overruled by a slight majority. The bar iron situation has also stiffened up considerably. The largest producers will only quote 1.30c, Youngstown, on business for early delivery, and are not anxious to close for any extended delivery at this price. On Monday the American Steel & Wire Co., the Pittsburg Steel Co., and the wire and wire nail interests of Ironton, O., and Ashland, Ky., issued a new uniform price list, which carries an advance of $1 a ton on wire nails and all wire products. For the past three or four months this market has been demoralized with the result that quotations dropped from $4 to $5 a ton from the last official prices announced by the American Steel & Wire Co. The new list bases all quotations f. o. b. mill, Pittsburg, and the quotations will carry somewhat more than one dollar advance to Western consumers, who have been reaping the benefit of the competition for the control of the Western market. This is the first agreement on wire nails and wire products that has been entered into for some time, and while numerous small concerns are not included in the agreement, all of the large factors in the trade in competition with the American Steel & Wire Co. have agreed to maintain prices. On the other hand the cut nail manufacturers at a meeting held here last Thursday reduced both iron and steel cut nails 10 cents a keg.

A meeting of the shafting manufacturers is being held

today at the Hotel Schenley. It is not probable that any change in existing quotations will be made. On Thursday the meeting of light rail manufacturers will be held here and a good attendance is assured. Owing to the large number of mills efforts will be made to curtail production and some of the manufacturers are in favor of establishing a central selling agency. Practically none of the light rail mills are now in operation, but this week sections from 16 to 40 pounds were advanced from $23 to $24 per ton by all the manufacturers who will be represented at the meeting. The producers of standard section rails are now offering their rejected sections to the light rail manufacturers for rerolling purposes. This is the first time in several years that this has been done, as there has been an understanding among the manufacturers of standard sections that none of the rejected sections be sold to the rerolling mills and instead they were cut up and remelted.

The gradual increasing demand for steel has resulted in the blowing in of a number of idle furnaces in this and the Valley districts. At the Edgar Thomson plant five idle stacks were blown in the last few days and two additional stacks will be blown in before the end of the week. Two idle stacks at the Carrie plant will also be blown in within a few days. The furnace of the Carnegie Steel Co. at South Sharon, Pa., was relighted after an idleness of nearly six months, while the Shenango stack at New Castle, Pa., will be blown in shortly. Since the first of the year, in addition to the stacks mentioned above, the Carnegie Steel Co. blew in one stack at Youngstown, O., and the Rosena furnace at New Castle, Pa. By the end of this week thirteen stacks of the Carnegie Steel Co. that were idle the close of last year, will be in operation. The Bessemer plant of the Homestead steel works resumed this week and the Shenango plant of the Carnegie Steel Co. will resume next Monday. Several of the departments of the South Sharon, Pa., plant also resumed this week.

Returns received by J. G. Butler Jr., chairman of the furnace operators' committee of the Central West, show that 103 furnaces out of a total of 156 were idle on Jan. 1. The idle capacity at the close of December represented 65 percent of the productive capacity. On Dec. 1 the above territory showed 91 furnaces idle and 65 in blast and the idle capacity represented only 57 percent. Thus during the month of December an additional 8 percent of the capacity became idle.

Pig Iron.—The pig iron market is exceedingly quiet and sales are almost entirely limited to small lots of foundry iron for prompt shipment. Southern iron is entirely shut out of this market owing to the low quotations of the Northern furnaces. A small lot of No. 2 was sold by a Valley furnace at $13.60, Pittsburg, this week, while $13.85 is being freely offered. On Bessemer iron as low as $13 at the furnace has been done, while $13.25 is the prevailing quotation on any future business that might be offered. The report that the Carnegie Steel Co. would enter the foundry iron market as a seller is untrue. The matter was considered, but it was decided not to produce foundry iron at this time. The Isabella furnaces have at times produced foundry when the demand for steel making iron had fallen off. One independent producer in the Ohio valley has decided to produce chilled foundry, but this will only represent a small portion of the output of the company's two furnaces, and when steel making iron is in good demand it is doubtful whether foundry will be produced at all. There is little danger of other steel producers making foundry iron at this time, as they are not provided with the proper ores, and should they decide to produce foundry to a limited extent in the future, there is the possibility of such a turn in the market at that time as would require turning their furnaces to steel making iron. We revise quotations as follows:

Bessemer, Valley	$13 00 to 13 25
Bessemer, Pittsburg	13 85 to 14 10
No. 1 Foundry	14 25 to 14 50
No. 2 Foundry	13 85 to 14 10
Gray Forge, Pittsburg	12 75 to 13 00
Chilled Basic, Valley	12 90 to 13 25
Chilled Basic, Pittsburg	13 75 to 14 10

Steel.—The Bessemer plant of the Homestead Steel Works started again this week while the Shenango Bessemer plant at New Castle, Pa., will resume operations next Monday. The Edgar Thomson plant is still shut down while the Ohio works at Youngstown, O., are running on sheet and tin bars and billets. The demand for billets and sheet bars is very light, and some of the mills not adhering to the agreement are shading quotations from $1 to $1.50 per ton. Under a receivership the Clairton Steel Co. is expected to be a disturbing factor in the steel market. The receiver cannot adhere to an association price without the consent of the court and it is doubtful if this will be asked. No doubt the receivers will sell steel whenever and wherever they see a profit, which means that they can cut the prevailing quotations to a considerable extent. Agreed quotations are as follows: Bessemer and open-hearth billets, 4 x 4 inches, and slabs, up to and including 0.25 carbon, $23, Pittsburg, Wheeling, Valley, Johnstown, Ashland, Ky., Ironton, O., and Lorain, O.; 0.26 and including 0.60 carbon, $1 advance and 0.61 to 1.00 carbon, $2 advance. Billets smaller than 3⅞ inches and sheet and tin bars are $1 per ton extra. Bessemer and open-hearth rods are still quoted at $30, Pittsburg.

Ferro-Manganese.—Domestic ferro, 80 percent, is held at $45.50 to $46 per ton, according to the quantity, delivered at buyer's mill, at points east of the Mississippi river.

Skelp.—Sheared iron skelp is somewhat firmer and is held at 1.55c to 1.60c, while grooved is quoted at 1.45c to 1.50c. Sheared and grooved steel skelp is held nominally at 1.45c to 1.50c.

Muck Bar.—There is little demand for muck iron, and it is held at $24 to $24.50, Pittsburg.

Spelter.—The spelter market has improved slightly and is stronger than for some time. Prime Western grades are held at 4.90c, delivered Pittsburg in carload lots.

Rails and Track Material.—The producers of standard section rails are now offering their rejected rails to rerolling mills. This is the first time in several years they have offered their rejected sections to these mills, as by mutual understanding it was agreed not to let the rerolling mills have advantage of these new sections. Light rails are now being uniformly held at $24 delivered, Pittsburg, for 16 to 40-pound sections. The meeting of light rail manufacturers to be held on Thursday promises to be well attended. We make the following quotations: Standard sections, 50 pounds and over, in lots of 500 tons and over, $28; car lots and less than 500 tons, $30; less than car lots, $32; 16 and 20 pounds, $24; 25 to 40 pounds, $24. Track material: Spikes, 1.90c to 1.95c; track bolts, square nuts, 2.25c to 2.30c; hexagon nuts, 2.40c to 2.45c; fish plates, 1.60c on orders accompanying large rail contracts, otherwise 1.80c to 1.85c is asked.

Plates.—Demand for plates has improved somewhat and outside mills are shading quotations on only a few sizes. The demand on the part of the steel car manufacturers has not increased appreciably since the first of the year. We quote as follows: Tank plates, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plates more than 100 inches, 5c extra 100 pounds. Plate 3-16-inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5c extra a hundred pounds for less than carload lots. Terms, net cash, in 30 days.

Bars.—A meeting of the steel bar manufacturers was held here today and the present situation was carefully canvassed. All the manufacturers in attendance reported a notable increase in specifications and new tonnage since the first of the year and a proposition was made to advance prices $1 per ton, but it was voted down by a small majority. The bar iron market has also improved to some extent and the largest producers are not quoting below 1.30c, Youngstown. We make the following quotations: Bessemer steel bars, 1.30c; open-hearth, 1.40c; plow beams and cultivator beams, 1.30c, net; channels, angles, zees and

tees, Bessemer, under 3 inches, 1.40c; common bar iron, 1.30c to 1.35c, Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds of a size and not less than 1,000 pounds, 10 cents advance; less than 1,000 pounds of a size, 30 cents advance. Hoops are quoted at 1.65c, full-extras, in 250-ton lots and over, and 1.75c in less than 250-ton lots. Bands are quoted at 1.30c and take the bar extras.

Structural Material.—The demand for structural material has improved somewhat and a number of large contracts are now pending. Competition among structural fitters is keen, which gives rise to rumors that mills are shading quotations, but this is denied. We quote as follows: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles, from 3 to 16 inches, 1.60c; universal mill plates, 1.60c.

Pipes and Tubes.—Demand has not improved to any extent, although the specifications received during the present week are for a larger tonnage than for some time. Discounts in carload lots to consumers, f. o. b., Pittsburg, plus freight to destination according to Tube Rate Book are as follows:

MERCHANT PIPE.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛, ¼ and ⅜ inch	70	60	67	57
½ inch	73	63	70	60
¾ to 6 inch	77	67	74	64
7 to 12 inch	71	61	68	58

EXRTA STRONG, PLAIN ENDS.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛ to 8 inch	69	59	65	55

DOUBLE EXTRA STRONG, PLAIN ENDS.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛ to 8 inch	61	51	57	47

BOILER TUBES.

	Steel.	Iron.
1 to 1¼ inch	42½	39
1¼ to 2¼ inch	56½	38
2½ inch	58	43
2¾ to 5 inch	64½	50½
6 to 13 inch	55½	38

Sheets.—The competition of the independent sheet mills, now that they have concessions from the Amalagamated Association, is beginning to have its effect on the market and black sheets, No. 28 gauge, are being quoted freely at 2.30c, in carload lots. Our quotations on black sheets in 500-bundle lots and over are as follows: No. 30, 2.75c; No. 29, 2.65c; No. 28, 2.30c to 2.35c; No. 27, 2.20c to 2.25c; Nos. 25 and 26, 2.15c to 2.20c; Nos. 22 and 24, 2.10c to 2.15c; Nos. 18 and 20, 2.05c to 2.10c; Nos. 14 and 16, 2.05c; Nos. 10 and 12, 1.75c to 1.80c. Galvanized, Nos. 10 to 17, 2.40c to 2.45c; Nos. 17 to 22, 2.60c to 2.65c; Nos. 22 to 25, 2.80c to 2.85c; Nos. 25 and 26, 3c to 3.05c; No. 27, 3.20c to 3.25c; No. 28, 3.40c to 3.45c; No. 29, 3.80c to 3.85c; No. 30, 4.30c.

Wire and Wire Nails.—The largest producers of wire products and wire nails have entered into an agreement to maintain uniform prices, and this week an advance of $1 a ton was made on all products. All quotations will also be made f. o. b. mill, Pittsburg, plus freight to destination per wire book. The cut nail manufacturers on the other hand, at their meeting held here last Thursday reduced both iron and steel cut nails 10 cents a keg or $2 per ton. We revise quotations as follows: Wire nails, carload lots, to jobbers, f. o. b. cars Pittsburg, $1.85, base; plain wire, carload lots, $1.75, base; barb wire, carload lots, $2.15 base; staples, carload lots, $2, keg. Galvanized, 30 cents extra. Carload lots to retailers are held at 5 cents advance in all lines, and on less than carload lots a further advance of 10 cents is charged. Steel and iron cut nails, carload lots, $1.70, and less than carload lots, $1.75, f. o. b. Pittsburg, plus freight to point of destination. Terms, 60 days less 2 percent off in 10 days.

Merchant Steel.—A meeting of the shafting manufacturers is being held today at the Hotel Schenley. No change in prices is anticipated. Demand for the finer grades of steel is not heavy, although the market shows some improvement. We quote as follows: Turned cold rolled and ground shafting, 52 off in carload lots and 47 percent off in less than carload lots. Tire steel, 1.70c to 1.80c; spring steel, 2.15c to 2.20c; toe calk, 2.15c to 2.20c. Tool steel is quoted 7 cents and upwards, according to the grade.

Old Material.—Demand for old material has improved to some extent, the demand for heavy melting stock and cast scrap having improved materially. Heavy melting stock is now held at $12 to $12.50 gross, Pittsburg, while cast scrap is held on the same basis. No. 1 wrought is quoted at $11.50 to $12, while borings and turnings are held at $6 and $7.50, respectively. Rerolling rails are held at $13.50 to $14, but there is little demand. Dealers are not anxious to take contracts for future delivery, and are only making the quotations noted above on material for delivery within the next month or two.

Coke.—Since the first of the year 2,000 idle ovens in the Connellsville region have been fired. The H. C. Frick Coke Co. this week fired 1,500 idle ovens, while the Rainey interests last week fired 500. Strictly Connellsville furnace coke for delivery the first half of the year is quoted at $1.45 to $1.50, while high sulphur cokes are held at $1.35 to $1.40. A few of the producers in the Connellsville region are holding out for $1.60 and $1.70 for furnace coke. Foundry coke strictly Connellsville is quoted at $1.90 to $2, although producers of grades very low in sulphur are receiving as high as $2.15 and $2.25. For the week ending Saturday, Jan. 2, the production of the upper Connellsville region amounted to 93,486 tons, an increase of over 10,000 tons as compared with the previous week. The production of the lower region amounted to 42,690 tons, an increase of 10,000 tons as compared with the previous week.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1115 MONADNOCK BLOCK, JAN. 12.

Now that the new year is fairly started and buyers are practically over the inventory period and other interruptions incident to the change of years, manufacturers of iron and steel products are commencing to size up the situation. It is noted that finished materials show a better tendency, but that pig iron does not share in it. There is a marked absence of snap in the demand for the Southern product, and this market is in a more apathetic state at present than for several weeks. Whether this condition is due to the general adoption of the $10 Birmingham basis for No. 2 foundry, or to the usual lull which follows a period of active buying, is an unsettled question in the minds of sellers. But there has been little trading during the week in Southern irons, and it is a question, from the present outlook, whether furnaces will be able to maintain existing quotations, notwithstanding the fact that some interests are well sold up for from 60 to 90 days and are now asking $10.50 to $11 for deliveries in the second quarter. Northern furnaces have lowered their prices to the basis of $14 Chicago for No. 2 foundry—a decline of 50 cents—and a considerable tonnage has been booked at this figure in the week under review, largely for deliveries in the first quarter, but in many cases for requirements extending throughout the second and third quarters.

In the improvement in demand for finished materials, bar iron and plates have shared particularly. The former is now generally held at 1.35c Chicago, though undoubtedly a desirable order could still be placed at 1.32½c. The volume of business booked during the past week was very heavy, estimated by one seller at 20,000 tons, with a corresponding increase in specifications. The tonnage of plates placed with mills is also large and includes several term contracts from shipbuilders and jobbers. The sales of wire products since the first of January, when the new schedule went into effect, have aggregated over 100,000 tons, and the leading interest has felt justified in advancing its prices $1 a ton, the same being effective Jan. 9. Jobbers and consumers of merchant pipe have shown their appreciation of the recent cut by placing heavy orders with mills. An improvement is also noticeable in the demand for cast iron pipe. New business in

structural steel is of small proportions, though specifications continue to improve. Sheets also are quiet and the present basis of 2.41½c for No. 27 gauge can be shaded. There has been some demand for boiler tubes, several jobbers covering for their yearly requirements. The general condition of trade in this product, however, is one of dullness. There is a better demand for scrap and some prices are 50 cents higher than those reported a week ago. Transactions in coke are numerous, though prices are without material change.

The Illinois Steel Co. which has had out of blast for some time 16 of its 18 furnaces, as well as its plants at Joliet and South Chicago, idle, will renew operations at Joliet this week in the rod and billet mills and converting department, and will also put in blast two furnaces at Joliet and an additional stack at South Chicago. It is not expected the rolling mills at the latter place will be started up before February.

Pig Iron.—Transactions in the past week have been almost exclusively with Northern furnaces, and they have booked a good round tonnage. For the past 10 days these interests have been selling iron on the basis of $14 Chicago for No. 2 foundry, a decline of 50 cents a ton from the prices of Jan. 1. No restrictions in the matter of deliveries have been placed upon buyers, the one price being made for requirements throughout the year; and at this figure a number of foundries have negotiated for the iron they expect to consume in 1904. Southern irons are quiet and little business has been closed on the $10 Birmingham basis. It is believed that some stacks below the Ohio river are shading prices, for sellers that have quoted $13.85 Chicago on pending business report that buyers state that they have been offered better prices elsewhere and later have placed the order. While it is true that leading furnaces have their capacity sold well towards the end of the first quarter, the slump in demand has come so quickly and is so marked that the question is immediately put forward whether or not it is due largely to the advance in prices. Southern furnaces are generally asking $10.50 to $11 for deliveries beyond March, but doubt is expressed in the present condition of the market, if foundrymen will pay these higher prices, or even if the $10 basis can be maintained. We have revised our quotations on Northern irons and quote as follows:

Lake Superior Charcoal	$16 50 to 17 00
Northern Coke Foundry No. 1	14 50 to 15 00
Northern Coke Foundry No. 2	14 00 to 14 50
Northern Coke Foundry No. 3	13 50 to 14 00
Northern Scotch Foundry No. 1	15 00 to 15 50
Ohio Strong Softeners No. 1	16 80 to 17 30
Ohio Strong Softeners No. 2	16 30 to 16 80
Southern Coke Foundry No. 1	14 35
Southern Coke Foundry No. 2	13 85
Southern Coke Foundry No. 3	13 35
Southern Coke Foundry No. 4	12 85
Southern Gray Forge	12 60
Southern Mottled	12 35
Southern Silveries (4% to 6% Silicon)	15 35 to 15 85
Jackson Co. Silveries (8% to 10% Silicon)	18 50 to 19 50
Alabama and Georgia Car Wheel	19 85 to 20 85
Malleable Bessemer	14 50 to 15 00
Basic Iron	14 35 to 14 85

Iron and Steel Bars.—The market has taken on sudden activity and there has been brisk buying during the past week, notably of bar iron. The tonnage that has been closed by mills approximates 20,000 tons, the deliveries running throughout the entire year. All classes of consumers are represented in this buying movement, though the bulk of the tonnage comes from the agricultural implement trade. Prices have advanced from 50 cents to $1 a ton as a result of this activity, and further increases are anticipated in the near future if the revival continues. Soft steel bars have shared in the improvement of the week, and manufacturers report an increased tonnage in both new business and specifications. The outlook for trade is better than it has been for some time, and mill representatives are inclined to believe that the turn has come and that for a time at least a good trade will be transacted. We quote bar iron, Chicago delivery, carload lots, mill shipments, 1.32½c to 1.35c Chicago, half extras. Soft steel bars, 1.46½c, half extras, Chicago delivery, carload lots, mill shipments, with 5c to 10c extra for less than carload lots; angles, less than 3 x 3, 1.56½c base, half extras; hoops, 1.81½c carload lots, full extras. Jobbers' quotations on iron bars are 1.50c to 1.60c base, full extras; steel, 1.60c to 1.70c; small angles, channels and tees, less than 3 x 3, 1.70c to 1.80c; hoops, 2.10c rates, full extras.

Billets and Wire Rods.—Trading in both products has been limited to small orders, the tonnage for the week being of small proportions. We quote wire rods, Chicago delivery, $32 to $33; open hearth and Bessemer billets, $24 Chicago, whether for rerolling or forging.

Sheets.—Trade in black sheets is quiet, transactions being limited to small lots. There is, however, an improved demand for galvanized material. The following quotations on black sheets can be shaded on desirable business. We quote Chicago prices on carload lots, mill shipments: No. 27 gauge black, 2.41½c to 2.46½c; No. 28, 2.46½c to 2.51½c; galvanized from mill, 80 and 2½ percent off. Store prices are without essential change, and we quote as follows: No. 16, 2.45c; Nos. 18 and 20, 2.55c; Nos. 22 and 24, 2.60c; No. 26, 2.70c; No. 27, 2.80c; No. 28, 2.90c; galvanized from store 75 and 7½ percent.

Plates.—Mills report that in the week under review, a large volume of business was closed, the tonnage running into five figures. The contracts included several from shipbuilders and jobbers whose annual requirements run very high. There is no change in prices, and we quote on mill shipments, Chicago delivery, as follows: Tank steel, ¼-inch and heavier, 1.76½c; flange steel, 1.66½c. From store, on small lots, we quote: Tank steel, ¼-inch and heavier, 1.90c to 2c; 5/16, 2c to 2.10c; No. 8, 2.10c to 2.20c; No. 10, 2.15c to 2.35c; flange steel, 2.25c, all f. o. b. warehouse.

Structural Steel.—Specifications continue to keep up to their past proportions, but the total volume of new business is not of any consequence. There is, however, a large tonnage being figured on, a considerable portion of which will be placed when spring is nearer at hand. Prices are without change, and we quote mill shipments, Chicago delivery, as follows: Beams and channels, 16 inches and under, 1.76½c; 18 inches and over, 1.86½c; universal plates, 1.76½c; angles, 3 x 3 and larger, 1.76½c; tees, 3 x 3 and larger, 1.81½c; zees, 1.76½c. On lots from store, we quote beams, channels and angles, 3 x 3 and larger, 1.90c rates; 18, 20 and 24-inch, 10c extra; tees, 1.95c rates.

Merchant Steel.—Implement makers continue to be the principal buyers, and several contracts have been received from these sources during the week. The outlook is one of optimism and prices are firm. We quote mill shipments, Chicago delivery: Spring steel, 2c; sleigh shoe, flat sizes, 1.60c; concave and convex, 1.75c; cutter shoe, 2.25c to 2.30c; smooth finished machinery steel, 1.71½c base; plow steel, 2.50c and upwards, according to quality; toe calk, 2.01½c to 2.11½c. Ordinary grades of tool steel, 6c to 8c; specials, 12c and upwards. Cold rolled shafting in carload lots, 52, and in less than carload lots, 47 percent discount from list.

Merchant Pipe.—The demand during the week has been very heavy, yearly contracts coming from many jobbers and consumers. The increase in business is attributed entirely to the recent cut, many buyers having held up their orders in anticipation of this step. We quote to consumers, carload lots, mill shipments, random lengths, f. o. b. Chicago, as follows:

	Steel Pipe.		Guaranteed Wrought Iron Pipe.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛ to ⅜ inch, inclusive	68.35	58.35	65.35	55.35
½ inch	71.35	61.35	68.35	58.35
¾ to 6 inch	75.35	65.35	72.35	62.35
7 to 12 inch	69.35	59.35	66.35	56.35

Less than carload lots, 12½ percent advance over above prices.

Boiler Tubes.—Several leading jobbers have placed their contracts for their yearly requirements in the past week, which has made the aggregate tonnage quite large. Demand from the consuming trade is quiet. We quote carload lots, mill shipments, Chicago delivery, as follows:

	L. W. Steel. Percent.	C. C. Iron. Percent.	Seamless Steel. Percent.
1 to 1½ inch	42.35	39.85	53.35
1¼ to 2¼ inch	54.85	37.35	40.35
2½ inch	57.35	42.35	.....
2¾ to 5 inch	63.35	49.85	Up to 4 inches.
6 to 13 inch	54.85	57.35	48.35

For car lots or less, direct from warehouse stock:

	L. W. Steel. Percent.	C. C. Iron. Percent.	Seamless Steel. Percent.
1 to 1½ inch	40	28	37.50
1¼ to 2½ inch	50	32.50	35
2¾ to 5 inch	60	45	Up to 4 inches.
6 to 13 inch	50	32.50	45

Rails and Track Supplies.—There is a good inquiry for both heavy and light rails, but actual business placed is largely for the latter material. We quote standard sections, 500 tons and over, $28; less than 500 tons to carload lots, $30; less than carload lots, $32; second quality rails, $27; 25-pound rails, $25 to $27; 12-pound rails, $26 to $28, with regular differentials for intermediate sizes. Track supplies, mill shipments, angle bars, 1.60c to 1.70c; spikes, first quality, 1.75c to 1.85c (out of store, 2.10c to 2.20c rates); second quality, 1.45c to 1.55c; track bolts, 3½ x ¾, with square nuts, 2.40c to 2.50c per 100 pounds (from store, 2.80c to 2.90c); with hexagon nuts, 2.55 to 2.65c (from store 3c), with usual differentials for other sizes.

Wire Products.—The leading interest announces an advance in its prices of $1 a ton. Since the cut of $3 a ton was made Jan. 1 the demand has been abnormally heavy, the aggregate tonnage booked since that time being estimated at over 100,000 tons. Dealers and jobbers have generally covered for their spring requirements, and having reduced their stocks to a low point in anticipation of the lower prices, are now clamoring loudly for shipments on their orders. We have revised our quotations, and quote to jobbers, Chicago delivery, as follows: Wire nails, carload lots, $2.05; less than carload lots, $2.10; cut steel nails, carload lots, $2.06½; plain wire, $1.95 carloads, and $2 for small quanttities; galvanized plain wire, $2.25 in carload lots, and $2.30 in lesser amounts; painted barb wire, $2.35 carloads, and $2.40 less than carload lots; galvanized barb wire, $2.65 carloads, and $2.70 less than carload lots. Staples, polished, carloads, $2.20; less than carload lots, $2.25; galvanized, $2.50 carloads, and $2.55 less than carloads. Bale ties, 82½ and 5 percent discount, f. o. b. Waukegan, Ill., on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet or DeKalb with actual freight allowed not exceeding 50 cents per 100 pounds.

Foundry Coke.—Foundrymen have patronized the market quite liberally during the past week, though carload orders have predominated in the sales of the week. We quote Connellsville 72-hour foundry coke, $2.25 to $2.50 at the ovens, or $4.85 to $5.15 Chicago. Southern coke ranges from $4.65 to $4.90 Chicago.

Old Material.—A marked improvement is noticeable in the condition of scrap iron. Material is scarce and dealers are holding prices firmly. Mills are not active buyers, though the stocks of most of them are low. We have revised our quotations, and quote dealers' selling prices, gross tons, as follows:

Old iron rails	$14 50 to 15 00
Old steel rails (mixed lengths)	9 50 to 10 50
Old steel rails (long lengths)	11 00 to 11 50
Relaying rails	24 00 to 24 50
Old wheels	12 00 to 12 50
Heavy melting steel	9 50 to 10 00
Mixed country steel	7 50 to 8 00

The following are selling prices for net tons:

No. 1 R. R. Wrought	$10 50 to 11 00
No. 2 R. R. Wrought	9 00 to 9 50
Shafting	11 50 to 12 00
Dealers' forge No. 1	9 50 to 10 00
No. 1 busheling and wrought pipe	8 00 to 8 50
No. 1 cast	11 00 to 11 50
Heavy cast (300 pounds and over)	8 50 to 9 00
Agricultural malleable	9 50 to 10 00
Iron axles	14 50 to 15 00
Steel axles	12 00 to 12 50
No. 1 boilers, cut	8 00 to 8 50
Cast borings	3 50 to 4 00
Mixed borings, etc.	3 50 to 4 00
Wrought turnings	6 50 to 7 00
Machine shop turnings	6 50 to 7 00
Iron axle turnings	7 00 to 7 50
Steel axle turnings	6 50 to 7 00
Stove plate and light cast scrap	9 00 to 9 50
Old iron splice bars	11 00 to 11 50

The firm of Gardner & Robinson, Chicago, jobbers in iron and steel products, has been dissolved. C. R. Robinson has become associated with the Inland Steel Co., Chicago, in the capacity of general manager of sales, and B. M. Gardner has opened an office at 541 The Rookery, where he will continue the business formerly conducted by the partnership. His agencies for the Chicago territory include the Northern Engineering Works, Detroit, Mich., makers of cranes, hoists and foundry equipment; the National Elastic Nut Co., Milwaukee, Wis., and the Wallace Machine & Foundry Co., Lafayette, Ind. He will also handle light rails, cars and other mine supplies, billets, rods, sheets, bar iron and steel, steel castings, machine bolts and rivets. Mr. Gardner has been in this line of business for the past three years, and has a large acquaintance in Western territory.

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, Jan. 12.

While there has been no formal discussion of ore prices, representatives of large mining interests declare that furnacemen who expect a reduction of $1 per ton are doomed to disappointment. They admit that there are large stocks of ore at the mines and on the docks, that furnaces are well supplied and that there is reason for expecting a reduction, especially on Mesabi ores, but they insist that the mining companies would rather suspend operations than sell at prices for which furnacemen are hoping. The United States Steel Corporation is moving considerably more ore from docks to furnaces, but the total amount moved each week by all furnaces is still small compared with last year.

The Lake Carriers' Association is meeting this week in Detroit and indications are that it will be stronger this year on account of the accession of important interests which are not now included in the membership.

Pig Iron.—Southern iron is firm at $9.75 to $10, Birmingham for No. 2, but as these prices are equivalent to $13.60 to $13.85 Cleveland, they are higher than present prices for Northern iron and there has been an almost complete suspension of purchases of Southern. Northern is weaker. The Valley price ranges from $12.75 to $13 for No. 2. In Cleveland No. 2 is sold at $13 to $13.25. Even these low prices have not brought out much business. We quote as follows for Cleveland delivery, save on Northern gray forge, which is at Valley furnace:

Bessemer	$13 85 to 14 85
No. 1 Strong Foundry	13 50 to 14 00
No. 2 Strong Foundry	13 00 to 13 25
No. 3 Foundry	12 25 to 13 00
No. 2 Southern	13 60 to 13 85
Gray Forge, Valley furnace	12 00 to 12 25
Gray Forge, Southern	11 85 to 12 00
Lake Superior charcoal	16 00 to 16 50

Finished Materal.—There is improvement in some lines but not enough to indicate a permanent change for the better, and in bar iron and sheets demoralization continues. The demand for wire products has so increased that the price has been raised $1 by the principal producer. This is attributed largely to the prosperity of the farmers. Sales of steel bars at 1.30c for Bessemer and 1.40c for open-hearth are of fair size and number. In bar iron, competition from Western mills is strong. They are selling on a basis of less than 1.20c at their mills whenever necessary to obtain business. Hence the large producers, who have been trying to hold the price at 1.30c, Youngstown, find it very difficult to obtain orders, though specifications have been better the past week, and new business in both iron and steel is more plentiful. In sheets, independents are very active, are quoting from $2.50 to $3 below the prices of the principal producer and are apparently doing considerable business. Prices of the principal producer through jobbers are as follows: Mill sales of black sheets, No. 10, 1.75c; No. 11-12, 1.80c; No. 14, 1.85c; No. 16, 1.95c; No. 27, 2.30c; No. 28, 2.40c. Galvanized, 75, 10 and 7 off. Out of stock prices are as follows: No. 10, 2.10c; No. 12, 2.15c; No. 14, 2.20c; No. 16, 2.30c; No. 18-20, 2.40c; No. 24, 2.45c; No. 25-26, 2.50c; No. 27, 2.55c; No. 28, 2.65c; No. 30, 3.10c. Galvanized out of

stock, No. 16, 75 and 7½ off; No. 18-20, 75 and 10 off; No. 22-28, 75, 10 and 2½ off.

Old Material.—There is a deadlock between buyers and sellers. Mills complain that they are not able to purchase scrap at what they consider reasonable prices. Dealers who have limited stock on hand declare that they can not buy to meet the demands of customers, while dealers who have stock on hand and also large producers of scrap are holding for higher prices. Reports from other cities of higher prices encourage those who have scrap on hand not to part with it at present prices, which have not changed during the week. We quote the following gross tons, Cleveland:

Old iron rails	$15 00 to 16 00
Old steel rails (over 6 feet)	11 00 to 12 00
Old steel rails (6 feet and under)	12 00 to 13 00
Old car wheels	13 00 to 14 00
Steel boiler plates	9 00 to 10 00
Malleable iron (railroad)	11 00 to 12 00
Malleable iron (agricultural)	9 00 to 10 00
Heavy steel	11 00 to 12 00

We quote the following net tons:

No. 1 R. R. wrought	$11 50 to 12 00
Mill scrap	9 00 to 10 00
No. 1 machine cast scrap	11 00 to 12 00
Iron axles	15 00 to 16 00
Axle turnings	9 00 to 10 00
Wrought turnings (free from cast)	6 00 to 7 00
Uncut wrought iron boilers	5 00 to 6 00
Grate bars	6 00 to 7 00
Pipes and flues (clean)	8 00 to 9 00
Tank iron	8 00 to 9 00
Hoop and band iron	5 00 to 6 00
Sheet iron	4 00 to 5 00
Wrought drillings	6 00 to 7 00
Stove plate	8 50 to 9 00
Steel axles	13 00 to 14 00
Cast borings	3 00 to 4 00

CINCINNATI.

Jan. 12.

The coke market has been more active in the recent past, and there is more disposition on the part of users to contract ahead for their supplies. Prices continue about the same, the best known brands being held at $2.40 to $2.50 at ovens. Other brands are selling mainly at $2.25 to $2.35 at ovens. Some makes are offered as low as $2 ovens. The going prices for ordinary business are within the $2.25 to $2.35 range.

Pig Iron.—The lowest quotation on foundry grades is now $9.75 Birmingham. A large number of the Southern producers are still holding up to their $10 price and a little iron has been sold at $10, but there is not much inquiry and it is difficult to tell whether the buyer is dissatisfied with the price or has all the iron he needs. There is one inquiry in the market for 5,000 tons of No. 2 and No. 3 foundry for delivery over the whole year. Another inquiry for gray forge from a foundry interest to make some large weights for the new waterworks has brought out a price of $8.25 Birmingham on this grade. It is reported that about 3,000 tons of the iron has been bought and that about 1,000 tons more will be needed. The general trade is quiet and there is very little iron selling here. It is believed that the buyer is not using much iron just now and that buying in the closing months of last year about filled the wants of many for the present. It is still the policy of the Southern furnaces to discourage quoting into the second quarter, and in fact there is very little correspondence that develops any need for such figures. Under the conditions prevailing it cannot be said that the market is either weak or strong. There is not enough business going to test the situation. Sales in this market for the first ten days of the new year have been decidedly meager. The following quotations are for prompt shipment and first quarter delivery, f. o. b. Cincinnati:

Southern Foundry No. 1	$13 00 to 13 25
Southern Foundry No. 2	12 50 to 12 75
Southern Foundry No. 3	12 00 to 12 25
Southern Foundry No. 4	11 25 to 11 75
Southern Foundry No. 1 soft	13 00 to 13 25
Southern Foundry No. 2 soft	12 50 to 12 75
Gray forge	11 00 to 11 50
Northern Foundry No. 1	14 65 to 15 10
Northern Foundry No. 2	14 15 to 14 65
Northern Silvery (8% silicon)	17 15 to 17 65
Southern car wheel iron	18 25 to 18 75

Finished Material.—While the market has not been active the past week there has been a fair run of orders for conservative quantities and the jobbers look with more confidence on the situation. There is less of a feeling that prices will decline further and iron bars are regarded as steadier with the lowest carload lot price now 1.30c f. o. b. Steel bars continue to be quoted at 1.43c base, half extras, with the retail price 1.75c for iron and steel out of store. Galvanized sheets are being quoted at 75 and 10 and 5 and 2½ percent off. We quote black sheets, No. 27, at 2.45c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.90c; No. 27, 2.80c; No. 16, 2.55c; No. 14, 2.45c; No. 12, 2.35c; No. 10, 2.30c. Tank plates are easy and sell out of store at 2c for ¼-inch and 2.10c for 3-16-inch. Beams and channels are quoted at 1.90c to 2c from stock, and angles at 1.90c to 2c for base sizes. In merchant pipe there is nothing to indicate that the new schedule of the leading interest is not being fairly well maintained and as some business is going at these prices it is believed that the market is fairly steady at the quotations.

MERCHANT PIPE.

(Basing Discounts.)

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛, ¼, ⅜ inch	68.7	58.7	65.7	55.7
½ inch	71.7	61.7	68.7	58.7
¾ to 6 inch, inclusive	75.7	65.7	72.7	62.7
7 to 12-inch, inclusive	69.7	59.7	66.7	56.7

BOILER TUBES.

	Steel Percent.	Iron Percent.
1 to 1½ inch	41.2	27.7
1¾ to 2¼ inch	54.2	36.7
2½ inch	56.7	41.7
2¾ to 5 inch	68.2	49.2
6 to 13 inch	54.2	36.7

Old Material.—The market is steady, with a moderate movement, but without change in dealers' quotations, which are:

Old No. 1 railroad wrought, net tons	$10 00 to 10 50
Cast machine and foundry, net tons	10 50 to 11 00
Old iron rails, gross tons	16 00 to 17 00
Old steel rails, gross tons	12 00 to 13 00
Old short lengths, gross tons	10 00 to 11 00
Old iron axles, net tons	15 00 to 15 50
Stove plate, net tons	9 00 to 9 50
Wrought turnings, net tons	6 00 to 6 50
Cast borings, net tons	4 00 to 5 00

PHILADELPHIA.

Jan. 12.

Business is extremely dull and there are few, if any, indications that conditions will improve in the near future. Mills are eager for orders and the tendency of prices is downward. In bar iron the competition is especially keen.

Pig Iron.—While there has been no decided change in conditions, prices show a tendency to decline and No. 2X foundry can be bought at $14.75 for ordinary orders and a lower price might be obtained for a large order.

Finished Material.—Bar iron is weak at 1.20c to 1.30c. Sheets are in fair demand, but there is no pronounced activity in any line. Agreed prices on structural material and billets are maintained.

Old Material.—There is better demand at slightly improved prices. We quote: Old steel rails, $11.50 to $12; miscellaneous heavy steel, $11.25 to $11.50; old steel axles, $14 to $16; old iron axles, $17 to $18; old iron rails, $14 to $15; old car wheels, $12.50 to $13.50; choice railroad No. 1 wrought, $14.50 to $15; country scrap, $13.50 to $14; machinery cast, $12.50 to $13; No. 2 light scrap (forge), $10 to $10.50; No. 2 light scrap (ordinary), $8 to $8.50; axle turnings, $10 to $10.50; wrought turnings, $8.50 to $9; cast borings, $6.25 to $6.75; stove plate, $10 to $10.50; wrought iron pipe, $10.50 to $11; boiler punchings, $14 to $15.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, NO. 150 NASSAU ST., JAN. 12.

Pig Iron.—As compared with the opening week of the new year, the market was more active during the past week. Still the transactions only represented a fair tonnage, which was considerably below that placed during the closing weeks of December. The feature of the week has been the entry into the market of large consumers. The General Electric Co. is out with an inquiry for 7,000 tons of foundry pig, and the International Steam Pump

Co. for 2,700 tons. Both inquiries call for delivery in the first quarter, and the orders are very eagerly sought, especially by Southern furnaces, which will probably get the major part, but not all, of the tonnage. Prices for Southern No. 2 foundry are ruling at $10 Birmingham. There are reports that this price is being shaded in Western localities, but it is being adhered to here. Current sales range from 25 to 500 tons. Advices here are that the two leading Southern furnaces are well sold up for the first quarter, and one of their agents in this city has been instructed only to sell to old customers for that delivery, and not more than 500 tons at a time. This company is willing to close business for the second quarter at $11 Birmingham, but has not booked any yet. On the whole buyers of Southern pig do not show any willingness to buy for extended shipment. They have been buying so long and so successfully on the hand-to-mouth principle, that they cannot be easily persuaded to relinquish it. As a result the majority of sales call for early delivery, and very few of them run through to the end of the first quarter. The outcome of the meeting of Southern interests in Birmingham today, relative to the revival of the Southern Pig Iron Association, is being awaited with much interest. Dispatches speak of the filing of a duplicate bill of lading at a general office, in case the movement is successful, but even this method of preventing sales at concessions is not thought much of, as it would permit the selling of No. 3 foundry on a No. 2 analysis. In Northern irons, there has been an increase in inquiries, but resulting sales have only been fair, and with prices a shade easier. New York prices are as follows: Northern No. 1X, $15.25 to $15.70; No. 2X, $14.75 to $15.20; No. 2 plain, $14.25 to $14.70; Southern No. 1 foundry, $13.75 to $14.25; No. 2 foundry, $13.50 to $13.75; No. 3 foundry, $12.75 to $13.25; No. 4 foundry, $12.25 to $12.75.

Billets.—Shipments of billets to England since Jan. 1 aggregate over 4,000 tons, some of these it is said netting the seller $13. For domestic consumption there have been very few sales, with the pool price shaded in nearly every instance.

Rails.—Nothing of importance can be said. No information has been given by the railroads as to when they will be in the market for substantial amounts, though there are reports that some interests are insisting upon a lower price. Orders since the new year opened have only been fair. Standard sections are $28 at mill.

Finished Iron and Steel.—In structural shapes the past week has been notable, both in the tonnage placed, and that which has appeared likely to be closed shortly. The American Bridge Co. booked orders for 7,000 tons from the Delaware, Lackawanna & Western railroad, and an additional order for 1,200 tons from the Chicago, Burlington & Quincy railroad. A 4,000-ton order for a steel elevator is being opened in Montreal today, but the above company is not a bidder. Bids will be opened in a few days for a bridge at Cambridge, Mass., calling for 7,000 tons. The contract for the 9,000 tons that the new building of the Printers & Publishers Co. in this city will require, is reported in a fair way for closing in the near future. Inquiries from the South are increasing, and small business is good. In plates only moderate activity can be noted, and nothing of any consequence is expected for a few weeks yet. Sheets are fairly active, but the outlook is growing brighter. Trade in bars has been good with prices unchanged. New York prices are as follows: Beams and channels, 15 inches and under, 1.75c to 1.90c; angles, 3 to 6 inches, 1.75c to 1.90c; zees, 1.75c to 1.90c; bulb angles, 2.05c to 2.35c; deck beams, 2.05c to 2.25c; sheared steel plates, tank, 1.74½c to 1.80c; flange, 1.84½c to 1.90c; fire-box, ordinary, 1.94½c to 2c; refined iron bars, 1.40c to 1.45c; soft steel bars, 1.40c to 1.50c; steel sheets, in carloads, New York, No. 28 black, 2.45c to 2.55c; galvanized, 75 and 10 and 5 off, and 75 and 10 and 2½ off.

Herbert Galer, who has been at the head of the Galer & Swaney Mfg. Co., Kansas City, Kan., has retired from business. The company has been re-organized as the Lake Shore Furnace Co., with F. D. Swaney as manager.

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, NO. 150 NASSAU ST., JAN. 12.

Pig Tin.—During the past week prices were firm, but with the trade situation showing the demand from consumers to have been extremely light. Current gossip credits manipulators with planning a bullish campaign, but consumers are not alarmed, and are confining their purchases to provide for pressing requirements. In London, where all bull movements have their origin, the prices of spot and futures today are the same, demonstrating that no confidence is placed in the market getting any stronger. The London market for the week was strong at first, but prices have receded during the past few days. Today's closings at the Metal Exchange were as follows: Spot and January, 29⅛c to 29⅜c. London's closing today for spot and futures was £132 17s 6d. Arrivals for the month to date at Atlantic ports were 705 tons, with 2,350 tons afloat.

Copper.—Under the stimulus furnished by unusually heavy export buying, the local and London markets have been exceptionally strong during the past week. The reports from trade centers speak of an improvement having taken place recently, and some of the largest producers are said to be contemplating increasing their prices. Both causes, together with the aid stock-jobbing interests can always be excepted to give, have brought about a stronger undertone to the situation. Today's closings at the Metal Exchange were as follows: Lake, 12¾c to 13c; electrolytic, 12⅝c to 12⅞c; casting, 12½c to 12¾c. London closed today as follows: Spot, £58 15s; futures, £58. Exports for the month to date amount to 5,088 tons, against 1,473 tons for a similar period last year.

Lead.—The scarcity of metal has become more acute, and spot commands from 4.40c to 4.50c. St. Louis and London are both firm at 4.17½c to 20c, and £11 8s 9d, respectively.

Spelter.—Is strong at 5.00c to 5.10c. St. Louis is 4.75c, and London £21 17s 6d.

Antimony.—Cookson's is weaker at 6¼c. Hallet's is 6⅛c, and other brands 5¾c to 6c.

Quicksilver.—Is quoted at $46 per flask of 76½ pounds in lots of 100 flasks. London is £8 5s.

Nickel.—Is selling at 40c to 47c for large lots down to a ton, and 50c and 60c for smaller quantities.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1115 MONADNOCK BLOCK JAN. 12.

The metal market is without material change, either with regard to demand or prices. Melters are buying only as their requirements dictate, there being an absence of season contracts. Quotations on Lake copper, carload lots, Chicago, are 12⅝c, and in small lots, 13c to 13½c; casting, carload lots, 12⅜c; smaller quantities, 13c to 13¼c. Tin is quoted at 29½c in small lots. Pig lead, 4.32½c in carloads, and 4¾c in lesser lots. Spelter, 5c carloads, and 5¾c to 6c for small lots. Antimony, 7¼c for Cookson's and 6½c to 6¾c for Hallett's in small quantities. Nickel is 45 to 60c, according to amount and deliveries.

The demand for old metals is fair. We quote dealers' selling prices as follows: Copper wire, $10.75; copper, heavy, $10.50; light copper, $9.50; red brass, $9.50; red brass turnings, $8.00; yellow brass, $7.00; yellow brass turnings, $6.00; lead, $3.75; zinc, $3.25.

As a New Year's gift to his sons, F. O. and J. B. Green, Samuel Green, of Des Moines, Ia., turned over his entire business to them. Mr. Green has retired from business at the age of 71. The firm has been known as S. Green & Sons, manufacturers of furnaces and stove repairs. Under the new arrangement there will be two companies, F. O. Green's department being known as the Green Furnace & Foundry Co., while J. B. Green's business will be known as the Des Moines Stove Repair Co.

THE IRON TRADE REVIEW

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TIN PLATE STOCKS ACCUMULATING.

A noteworthy state of affairs prevails in the tin plate industry. The American Sheet & Tin Plate Co. is producing at the rate of about 200,000 boxes per week, while the independents are turning out less than 30,000 boxes per week. Of the leading interest's regularly operative mills 80 percent are in operation, while of the independents only a small fraction are running. Just how many "regularly operative" mills there are among the independents cannot be accurately stated, since there is a very wide variation in the financial strength of independent companies and in the mechanical equipment of their plants. There is no question, however, that a large number of independent mills, which are fully capable of making tin plate without loss at the present market price, are nevertheless idle or running very slack.

These independent plants are not in operation because there is not sufficient current demand for tin plate. The leading interest's mills are kept in such full operation largely because they are making stocks. The warehouses attached to several of the tin plate works, including the Shenango, Greer and La Belle, have been entirely filled and the product is now being stocked in warehouses controlled by other subsidiary steel corporation interests. In the three warehouses referred to alone the stock amounts to about 700,000 boxes.

There seems to be no question, in all the preparations being made, that there is in mind the inevitable readjustment in tin plate wages, and especially in tonnage rates. While there has been a general revision of sheet wages in both union and non-union sheet mills, there has been a revision of tin plate wages only in the non-union mills, and these constitute a much smaller proportion of the total than they do in the sheet industry. A part of this readjustment will be in connection with the more general introduction of the Bray process for rolling black plate, but there is no doubt that there will also be a desire not many months hence to readjust wages in the mills operated in the regular way, to a more rational basis. The present tin plate wages are the highest ever paid, and are much higher per ton than those in the original scale which prevailed during the McKinley duty. These wages were admittedly very high. Wages are still higher per ton now, and the men are making a much greater output per turn, so that their weekly receipts are very much greater than they were when the industry was in its infancy. It is true the employment of helpers is much more general, but after they are paid the regular tonnage men still retain a part of the gain they have made.

HIGH SPEED STEELS AND MACHINE DESIGN.

The statement has been made in some forecasts for the new year that the new high speed steels have not been taken into consideration in making stock machinery and that there is a demand for a general redesigning of machine tools. The situation to which attention is thus called involves a number of considerations besides those submitted in the foregoing statement. Ever since the epoch-making experiments by Messrs. Taylor and White at the Bethlehem Steel Co.'s plant there has been no doubt of the tendency of the times. Faster speeds, more vigorous cuts, lead naturally to machines of greater sturdiness and the amount of metal alone has been an increasing factor to this end. There are few if any machine tools that during the reconstruction period following the forging of the improved weapons of attack have not taken on a thicker coat of iron and steel. The all-gear feeds that have been put forth so rapidly and the sustained interest in the subject tell unmistakably of augmented tension on machine tools. That there will be greater flywheel effect in face plate and cone, enlarged bearings of spindles and carriage, etc., is a natural transition in the progress of design.

The specialization of work will require that for many purposes heavy machines must be designed for the task of removing misplaced material. A considerable share of the metal cut away in the machine shop comes in this class and the heavy chip at any speed is only meritorious where the presence of so much metal at the outset is absolutely unavoidable. Perhaps with the advance in forging and press work and in foundry precision, a die, a broach or an abrasive wheel may dispense with many of the conditions now making for heavy chips.

The stock machine of the day has been evolved under the constraint of the older influences, however, and has undergone occasional change if only to maintain step in the ranks. Not even the remarkable demand of the past few years forced out of sight the necessity of improvement and most manufacturers have added to the good qualities of stock machines. Under the pressure of greater competition for business the incentive to perfect to a higher efficiency will be the more urgent, but it has been by no means overlooked in recent years.

The contest between the methods of machine builder and user is no recent struggle, and is comparable to the artillery problem where increasing powers of penetration are met by greater resistance, the gun and target profiting continuously by the general progress of the arts and sciences.

MILWAUKEE FOUNDRYMEN'S ASSOCIATION.

(Special Telegram.)

MILWAUKEE, WIS., Jan. 12.—After the regular meeting of the Milwaukee Foundrymen's Association in the club room of the Pfister Hotel, this evening, an informal dinner was given to the foundrymen of the city, and hereafter this will be an annual affair. W. J. Turner, president of the Western Malleable & Gray Iron Mfg. Co., was chairman and toastmaster of the evening. The program included addresses on the subjects named by the following gentlemen: "The National Founders' Association," Irving H. Reynolds; "American Foundrymen's Association," Charles E. Sammond; "Milwaukee Foundrymen's Association," Thos. W. Sheriffs; "National Association of Manufacturers," Frederick W. Sivyer; "The Employer's Rights," A. J. Lindemann; "The Next Molders' Agreement," O. W. Greenslade. A paper prepared by Capt. I. M. Bean, of the Northwestern Iron Co., Mayville, Wis., on "The Business Situation," was read by Fred M. Prescott in the former's absence.

The dinner was given largely for the purpose of bringing the foundrymen of the city together for an interchange of ideas and with the hope of augmenting the membership of the association which still lacked the names of a number of the local founders. It was largely attended, representatives being present from nearly every foundry in the city. The existing agreement with the molders' union expires in May, and while no action was taken at the meeting this evening, aside from instructing the president to appoint a committee of five to prepare to take the matter up at the proper time, the applause accorded to the sentiments of the various speakers was indicative of the unanimity of those present for strong local organization in dealing with the future demands of the molders' union. Members were urged to join not only the local organization but the National Founders' Association by the various speakers. Announcement being made that in the near future Commissioner O. P. Briggs and President I. W. Frank, of the National Founders' Association, would visit Milwaukee on their tour of the country and would address the members of the Milwaukee Foundrymen's Association on the necessity of becoming members of the National body, it was decided to give a banquet on that occasion and invite all the foundrymen in the city to be present.

At the business session previous to the banquet Walter Reed, president of the Filer & Stowell Mfg. Co., was elected president of the association to fill out the unexpired term of T. J. Neacy, of the same company, who resigned. W. J. Fairbairn, secretary of the Metal Trades and Founders' bureau of Milwaukee, was elected secretary to succeed T. W. Sheriffs, resigned.

Edgar Thomson Mills to Resume.

(Special Telegram.)

PITTSBURG, Jan. 13.—The Edgar Thomson converting department and rail mill which have been shut down for three weeks, will probably resume tomorrow. The new engine is in place and repairs are completed.

Referring to the present operation of the plan for stockholding by employes of the United States Steel Corporation, Treasurer Richard Trimble has made the following statement: "The plan adopted Dec. 31, 1902, is still in force and employes are subscribing for the second year on the basis of the first year except that the price fixed for the second year is $55 per share."

Former Superintendent George W. Parsons, of the frog, switch and signal department of the Pennsylvania Steel Co., was tendered a dinner at the Harrisburg Club, Harrisburg, Pa., Jan. 9, by the heads of the various departments. Mr. Parsons leaves this week for Europe. On his return he will become a member of the advisory board, with headquarters in Philadelphia.

The report that the Hirsch Rolling Mill Co., of St. Louis, has bought a tract of land at Elmwood Place, near Cincinnati, and will begin the erection of a mill at once, is not confirmed. The matter was under consideration some months ago but was not closed.

OBITUARY.

Homer H. Swaney, formerly of McKeesport, Pa., was among the passengers lost in the sinking of the steamer Clallam near Port Townsend, Wash., Jan. 9. He was born at Elizabeth, Pa., 47 years ago. For a number of years he was identified with traction interests of McKeesport and Connellsville. About four years ago he organized the Pacific Steel Co. at Irondale, Wash. The company acquired the abandoned Irondale blast furnace, overhauled it and it was blown in Dec. 15, 1901. The building of a rolling mill and open-hearth steel plant was included in the plans of the company.

Jeremiah M. Allen, president of the Hartford Steam Boiler Inspection & Insurance Co., died at Hartford, Dec. 29, aged 70 years. The life work of Mr. Allen was with the company of which he was president since 1867. He was interested in insurance matters before that. For a number of years he was a lecturer upon insurance at Cornell University and at the Worcester Polytechnic Institute. He was a member of the American Society of Mechanical Engineers.

Congressman W. W. Skiles, of the fourteenth Ohio district, died at his home at Shelby, O., Jan. 9. Mr. Skiles was born in Stoughstown, Pa., Dec. 11, 1849. He had long been a resident of Shelby and was prominently identified with its business interests. He was president of the Shelby Electric Co., a director of the Shelby Stove Co. and the Shelby Steel Tube Co.

Pittsburg Coal Co. Bond Issue.

(Special Telegram.)

PITTSBURG, Jan. 13.—At a meeting of the board of directors of the Pittsburg Coal Co., held here yesterday afternoon, it was decided to issue a new series of bonds amounting to $25,000,000. The proceeds will be used to pay off the floating indebtedness and to supply working capital for future operations. All the bonds will be taken by the Union Trust Co., of Pittsburg, and they will be issued as required in the future. The directors declared the usual quarterly dividend of 1¾ percent on the preferred stock. This will be paid in script under date of Jan. 25, 1904, and redeemable in one year or at any prior time at the option of the company.

Everett E. Whitney, for fourteen years auditor of the Pennsylvania Steel Co., has resigned. Mr Whitney went to Steelton in 1886 and accepted a position in the auditor's department, which he held until 1890, when he was chosen auditor. When the company learned of Mr. Whitney's intention to resign, it wrote him a letter commending him in the highest terms for his efficient work while he was in its employ.

Seventy-five St. Louis stockholders of the United States Steel Corporation held a meeting Jan. 8 to organize a movement to obtain representation on the board of directors of the corporation. It was developed that about 300 St. Louis investors lost a large amount of money as a result of the recent slump in the common stock. Most of the holdings in St. Louis are of common stock, and the owners assert that they have not been fairly treated by the controlling interests in the corporation. At New York, 20 holders of 53,000 shares of common stock met at the office of Henry H. Hayman and discussed plans to compel the directors of the corporation to declare a dividend. They agreed to meet again at the same place bringing others, making a total of 225,000 shares.

At Cumberland, Md., a suit has been on trial the past week, brought by Joseph Josephs & Bros. Co., of Cincinnati, against the Schonthal Iron & Steel Co., of Cumberland. The plaintiff contracted to deliver 1,000 tons of old steel rails. Defendant refused to receive most of them, claiming they could not be rerolled.

N. S. Braden, formerly manager of the Westinghouse Electric & Mfg. Co.'s district office at Cleveland, has been appointed sales manager of the new Canadian Westinghouse Co., Ltd. Mr. Braden succeeds the late Thomas C. Frenyear, who died Dec. 10, 1903. Mr. Frenyear's office was at Toronto, but Mr. Braden will make his headquarters at Hamilton, Ont.

The Labor Situation.

ST. LOUIS METAL TRADES ASSOCIATION.

The St. Louis Metal Trades Association's Weekly Bulletin No. 24, dated Jan. 2, says: "Since the last Bulletin was issued Dec. 19, calls have been received from members for 21 men and from non-members for 15 men. Every call received from members was filled by the department and a few recommendations have been made for the vacancies outside our membership. The above calls represented machine, bench and floor hands, tool makers, die makers and brass workers."

In reviewing the six months' work of the department the Bulletin says: "Although the employment department was established June 1, the active work of filling vacancies can hardly be said to have commenced until July of last year. During the past six months 586 vacancies were filed with the department, or an average of 64 per month. The classification of these calls is shown by the following figures: Machinists, 31 percent; machine hands, 20 percent; tool and die makers, 4 percent; patternmakers, 9 percent; blacksmiths and helpers, 3 percent; brass molders, 5 percent; polishers and buffers, 2 percent; brass finishers and assemblers, etc., 3 percent; brass foundry helpers, 4 percent; handy men and boys, 7 percent; foremen, 1 percent; platers, 1 percent; firemen, wood workers and miscellaneous help, 10 percent.

"During the month of July the percentage of vacancies filled by the department was 66. This has been gradually increasing until now we are filling 90 percent of the vacancies reported. The mechanics recommended by the department during the first three months were a little below the average on the whole and for this reason more changes occurred. At the present time the best mechanics in St. Louis are securing employment through your bureau and applicants sent from this office are above the average.

"The work of the department has not been confined to supplying help to its members. Calls have been received from Quincy, Springfield and Joliet, Ill.; Anderson, Evansville, Indianapolis and Marion, Ind.; Niles and Toledo, O.; Keokuk, Iowa; Marked Tree, Ark.; and Birmingham, Ala. Recommendations have been made for many of these vacancies, but we have no means of obtaining the exact result of such recommendations."

Commissioner DuBrul, of the National Metal Trades Association, says that the St. Louis report is in line with advices received from Boston, Worcester, Pittsburg, Cincinnati, Milwaukee and Detroit.

LOWER WAGES FOR PUDDLERS AND FINISHERS.

The wages of puddlers and finishers for the months of January and February will be greatly reduced as the result of the bi-monthly conference held at Youngstown, O., on Monday, Jan. 11, between the officials of the Amalgamated Association and representatives of the Republic Iron & Steel Co. and the Carnegie Steel Co. As the average selling price of bar iron during the past two months was 1.30c the wages of puddlers was reduced from $5.75 to $5.25 per ton, while bar mill heaters and finishers were reduced 4 percent. Should the selling price of bar iron fall below 1.30c, the wages of the puddlers will be reduced to $5 a ton which is the base of the Western scale. The scale provides that when bar iron is selling at 1c to 1.2c inclusive, puddlers shall be paid $5 per ton. For each advance of 10 cents per 100 pounds in the selling price of bar iron an advance of 25 cents shall be granted the puddlers until the selling price shall be 2 cents per pound or $2 per 100 pounds. As sales of bar iron have been made on the basis of 1.25c, Youngstown, in the past month, it is believed that the wages of puddlers will be reduced to $5 per ton for the months of March and April.

LABOR NOTES.

The Austin Mfg. Co., the Buda Foundry, Bliss & Laughlin, and the Whiting Foundry Equipment Co., all of Harvey, Ill., which had been closed down for some weeks, have resumed operation and put in force the ten-hour day.

Superintendent McDonald of the Ensley (Ala.) plant of the Tennessee Coal, Iron & R. R. Co., has given notice to employes that "owing to the continued demoralized condition of the steel trade," the management is compelled to reduce wages about 15 per cent. Wages of laborers receiving $1.00 per day have not, however, been changed.

Employes of the Waukegan (Ill.) plant of the American Steel Wire Co. have received notice of the second cut of 10 per cent. On wages a short time ago there was a cut of 10 per cent and the second cut applies to all not affected at that time.

An employers' association, which is the direct outgrowth of recent troubles with organized labor, notably the strike of the structural iron workers, has been formed at Indianapolis. It now contains a large majority of the principal employers of that city. John L. Ketcham of the Brown-Ketcham Iron Works, was elected president. The organization will be affiliated with the Citizens' Industrial Association of America.

The Carnegie Steel Co. having refused to submit a new schedule to the employes at the Mingo Junction plant, the Amalgamated association has voted to cancel the contract which runs until July and adopted a resolution allowing each man to make an individual contract with the company.

The Parkersburg Iron & Steel Co., Parkersburg, W. Va., paid off its 500 union employes Jan. 5 and opened its plant Jan. 11 as an open shop at a reduced scale of wages.

The entire plant of the Indiana Wire & Nail Co., Muncie, Ind., is closed on account of the wire drawers who refused to accept a reduction in wages.

Boilermakers at the Tennessee Coal Iron & Railroad Co.'s steel plant at Ensley, Ala., the molders in the foundry and the employes at the new furnace at Ensley have refused to accept the 15 percent reduction in wages, and have gone on strike. President Bacon stated that there is no haste for the new furnace and that no inconvenience will be felt.

The molders of the Sharon Foundry Co., Sharon, Pa., who refused a 10 percent reduction in wages, have accepted a compromise proposition from the company and have returned to work.

Upon the application of the National Iron Co., Duluth, Minn., an injunction was granted restraining the members of the local molders' union from interfering with the company in replacing the strikers. On Oct. 5 the company decreased the minimum scale for molders from 33 cents to 30 cents per hour and that scale became effective Oct. 12, coremakers to be paid in the same proportion. On Oct. 29 a strike was promulgated.

Because the Electrical Contractors' Association, of Buffalo, recently opened its shops to non-union workmen, about 160 union men have quit work. As a result a tie-up in other building trades is probable.

On account of recent reductions in wages of employes of the United States Steel Corporation many workingmen employed by the corporation have surrendered their claim on the stock subscription and requested that the amounts paid by them be refunded. The workingmen say that with the reduced wages it is impossible to keep up payments on the stock.

Work has been resumed in nearly all the departments of the Joliet plant of the Illinois Steel Co. which had been closed down four weeks. Nearly 3,000 men were recalled to work Monday.

Fifteen railroads represented in the General Managers' Association of Chicago, report the laying off of 18,000 employes in the last three months. The majority of those laid off were employed in the maintenance of way departments.

Cuts amounting to from 7½ to 15 percent have been announced in the wages of the men employed by the Youngstown Iron Sheet & Tube Co., Youngstown, O.

About 150 iron molders, of Akron, O., went out on strike Jan. 12 because of a reduction of 10 percent in wages, which went into effect on Jan. 1.

A reduction of about 10 percent in the wages of blast furnace workers in the Hanging Rock, O., district, went into effect the first of the year, applying to 3,000 men. The locals in the district held a meeting to discuss the cut, but no action looking to opposition was decided upon. The reduction is equal to the advance made last April.

PERSONAL.

Gen. Asa S. Bushnell, governor of Ohio from 1896 to 1900, and for many years prominently identified with the manufacture of agricultural implements, was stricken with paralysis while in Columbus, Jan. 11, after attending the inauguration of Gov. Herrick. His physicians state that there is little hope for his recovery, as he is believed to be slowly sinking. Asa Smith Bushnell was born at Rome, N. Y., Sept. 16, 1834, and moved to Springfield, O., in 1851. He was one of the founders of the Warder-Bushnell-Glessner Co., manufacturer of "Champion" reapers and mowers, and was for many years its president. The company was absorbed by the International Harvester Co. in August, 1902. He was captain of a company of the 152d Ohio Volunteer Infantry in the civil war and was quartermaster general on the staff of Governor Foraker.

Gibson D. Packer, who for the past fifteen years has been associated with the Carnegie Steel Co. as solicitor, has resigned. Mr. Packer was appointed solicitor under the old Carnegie copartnership and was made one of the Carnegie partners, owing to faithful services rendered, early in the nineties. It has not yet been announced whether Mr. Packer will establish himself in practice in Pittsburg or not.

A decree in distribution was made by the Orphans' Court in Pittsburg last week in the estate of Thomas M. Jones, former general manager of the South Side mills of the Jones & Laughlin Steel Co., and a brother of the late B. F. Jones, the former having died nearly twenty years ago. The estate, valued at $1,601,716.78 is divided into three equal parts, the beneficiaries being William Larimer Jones, manager of the South Side mills of the company, Mrs. Mary M. J. Hilliard and the infant daughter of the late Thomas Mifflin Jones Jr.

George Hunter, manager of the Youngstown, O., plant of the American Bridge Co., has been appointed assistant manager of the Ambridge, Pa., plant of the American Bridge Co. J. M. Boyd succeeds Mr. Hunter as manager of the Youngstown plant.

Charles H. McSwigan, who for nearly ten years has been connected with the Carnegie Steel Co. and the H. C. Frick Coke Co., Pittsburg, Pa., in the capacity of press agent, resigned on Jan. 1, to accept the position of manager of the Pittsburg office of C. I. Hudson & Co., dealers in stocks and bonds of New York. The company's suite is at 701 Frick building.

O. W. Kennedy, general superintendent of the H. C. Frick Coke Co., and allied fuel interests of the United States Steel Corporation, with headquarters at Pittsburg and Uniontown, Pa., has resigned, the change to take effect Feb. 1. His resignation is attributed to ill health. Fourteen years ago Mr. Kennedy entered the employ of the H. C. Frick Coke Co. in the capacity of a clerk, later becoming auditor and assistant superintendent to Thomas Lynch when the latter was general manager of the company. In 1897 he succeeded Mr. Lynch as general superintendent and has held that position ever since. His responsibilities have grown greatly since the organization of the United States Steel Corporation, as all the coking properties in the Connellsville region owned by the subsidiary companies were put in his charge.

W. W. Wilson, superintendent of the Girard mill of the Carnegie Steel Co., has resigned. R. R. Howells, his assistant, has been made superintendent.

W. S. Mathias has been made general superintendent of the plant of the Illinois Steel Co. at Joliet. His former position of assistant superintendent at the South Chicago plant has been taken by E. D. Clark, who had been consulting engineer in the electrical department.

M. Holub, formerly of the Akron Scrap Steel & Iron Co., Akron, O., has severed his connection with that concern and has begun business for himself under the firm name of the American Scrap Iron Co.

Irving H. Reynolds, formerly with the Allis-Chalmers Co. and for many years in charge of its pumping engine department has accepted a position with the William Tod Co., of Youngstown, as consulting engineer and is in charge of the department devoted to the building of large high duty crank and fly wheel pumps, giving most of his attention to this branch of the business.

John Chappell, head of the statistical bureau of the United States Steel Corporation, has resigned.

The Foundrymen's Association.

The regular monthly meeting of the Foundrymen's Association was held at the Manufacturers' Club in Philadelphia, on Wednesday evening, Jan. 6, the president, Thos. Devlin, occupying the chair. The following were among those present:

Thos. Devlin, Thos. Devlin Mfg. Co., Philadelphia.
W. P. Barba, Midvale Steel Co., Nicetown.
A. A. Miller, *Iron Age*.
Andrew Bryson and S. S. Deemer, Brylgon Steel Casting Co., Reading, Pa.
David S. Cann, Cann & Saul.
A. Simonson, Wm. Wharton Jr. & Co.
A. W. Allen, A. & P. Roberts Co., Pencoyd, Pa.
S. A. Cochran, Frank Samuel.
Chas. D. Orr, Thomas, Roberts, Stevenson Co.
John J. Fleming, S. J. Creswell Iron Works.
D. Reidenhauer, Thacher Furnace Co, Newark, N. J.
W. A. Perrine, Abram Cox Stove Co.
E. H. Clymer, Ajax Metal Co.
T. Burd Zell, Penn Steel Casting Co., Chester, Pa.
John T. Dickson, Chester, Pa.
W. H. Green, Vulcan Works, Chester, Pa.
Robt. Stinson, Delaware River I. S. & E. Co., Chester, Pa.
Jas. A. Strain, Robt. Wetherill & Co., Chester, Pa.
P. J. McEntee, J. F. Cole, F. Bent and Richard Peters, Solid Steel Casting Co., Chester, Pa.
A. E. Groome, Bethlehem Steel Co., S. Bethlehem, Pa.
Wm. Burns, Baldwin Locomotive Works.
S. G. Flagg Jr., S. G. Flagg & Co.
N. Lilienberg.
J. F. Gaehring, J. W. Paxson Co.
E. E Brown, E. E. Brown & Co.
W. J. W. Moore, Pilling & Crane.
F. C. Pullman, J. Wesley Pullman.
T. B. Harkins, Harkins Foundry Co., Bristol, Pa.
Thos. Holt and Benj. Holt, Camden Foundry Co., Camden, N. J.
J. Hy. Pepper, *The Iron Trade Review*.
E. Cooper Wills, Trenton, N. J
H. O. Evans, Thos. Devlin Mfg. Co.
O. J. Ward, Howe Scale Co.
Ed. Frohman, S. Obermayer Co., Cincinnati.
P. J. Potter, E. T. Etting.
N. Mager, Logan Mfg. Co., Phœnixville, Pa.
Fred. Baldt Jr., Bethlehem Steel Co., S. Bethlehem, Pa.
J. S. Hibbs and Howard Evans, J. W. Paxson Co.
H. C. Matlack, Frank Samuel.

The treasurer reported a balance in hand of $1,807.77 and all bills paid.

E. E. Brown, chairman of the committee of the association on the foundry exhibit project for the St. Louis Exposition, reported that as a result of the appeal to members about $1,500 would be forthcoming as Philadelphia's contribution to the general fund.

A letter from the Franklin Institute was read, inviting members to be present at the Institute on the evening of Jan. 7, to hear a lecture by A. E. Outerbridge on "The Results of Some Recent Investigations in Casting Iron."

The paper of the evening was by N. Lilienberg of Stockholm, Sweden, entitled "Side-Blown Steel Converters," and was read by Jos. S. Hibbs. It was as follows:

SIDE-BLOWN STEEL CONVERTERS.

Steelmakers are divided as to the economy of making castings from Bessemer steel blown in small converters with horizontal tuyeres. Large amounts of money and work have been spent on experiments and some manufacturers have discarded the process after it had been duly installed and operated. This naturally causes others to hesitate and hampers the progress in the whole. Everything depends on the method being carried out in the right way; we then know what to expect from it. I give below some observations, after having consulted several experts and having seen some plants of this kind in operation. Most of the previous publications have been made by agents advocating a special construction, claiming all possible advantages for it and hiding the disadvantages. I am agent for no steel process and will try to take the independent stand of a manufacturer investigating whether it will pay him to erect such a plant. It is of course impossible to exhaust the matter entirely, because a number of people are working with improvements, which may change the aspect after a while. In gathering information I am especially indebted to Mr. Bradley Stoughton of New York City who has made many investigations in this line.

The Markets for Different Castings.

It has been generally conceded that the superheated steel made in side-blow converters cannot compete with open-

hearth and bottom-blown steel for heavy castings and for ingots to be rolled and forged. The field at present mainly assigned to it includes castings of light weight, thinness and of ornamental designs. It would be impossible to fix an upper limit for the weight, but I have been informed that several 10-ton castings have been made from 2-ton side-blow converters, the superheated steel being retained in a ladle until the next charge is blown. The lower limit can be said to be only a few pounds. Side-blown steel has a place between crucible and open-hearth steel. The castings have mostly no higher carbon than 0.25% and it would be too expensive to melt such steel continually in crucibles.

It was my intention to make some kind of classification by comparing illustrated catalogues and price lists of different foundries, but these are not generally issued on account of the endless variety of new shapes. In a general way it may be said that small castings from superheated steel may compete with cast iron, malleable iron, drop forgings, pressed steel and bronze. The competition with cast iron can only take place in cases where lighter weight with the same strength is desired. This is especially the case with naval constructions and with running machinery; thus, with wheels of all kinds, cogwheels, pulleys, small truck wheels, etc. The competition with malleable iron will depend on many local circumstances. That process can only penetrate to a certain depth and takes a comparatively long time, in both of which the steel has the advantage. On the other hand the castings of malleable iron are more easily made and the sink-heads and gates are much easier to remove and dispose of. There is undoubtedy a field for competition with drop forgings for a numerous variety of soft steel tools and other objects. These must, however, be limited to cases where no special strength is required, because a drop-forged article made from rolled steel is undoubtedly stronger than a steel casting. The same thing applies to cold-pressed sheet steel which has of late come into extensive use. In ornamental castings bronze of course takes the lead, but many objects are made of cast iron and painted bronze. There are, however, some lower limits beyond which it does not pay to make those small articles of cast iron, and here soft steel can take its place. It is doubtful if such steel will come into use for stoves, as cast iron properly constituted will fill out all the ornamental designs required and no special strength is needed.

Dynamo Magnet Steel—It has proved possible to produce superheated side-blown steel entirely sound, uniformly lower in carbon and manganese than any open-hearth or bottom blown steel. As the manganese is, above everything, objectionable to the permeability, many tests have shown that with the ordinary magnetizing force it has been possible to increase the induction about 10 percent by using the above named steel. This is what is claimed by M. Tropenas in a pamphlet and has been corrobrated by outside impartial parties. The permeability and hysteresis curves from such steel in fact approach those of Swedish iron. To demonstrate the great influence of manganese in this respect, I may mention a case under my observation, comparing two irons where the permeability was greater, although the carbon was three times as high only on account of the absence of manganese.

Centrifugal Castings—The many devices to make steel castings hollow in a rotary mold have principally met with the obstacle that a large quantity of open-hearth steel cannot be kept liquid long enough for casting, rotating and removing hollow ingots. But it seems to me that the question could be brought to life again now that superheated soft steel can be obtained in small quantities from side-blow converters. Having made some investigations in that matter, I hope to return to it on another occasion.

Ingots for Rolling or Forging—As far as I know these are not regularly produced in appreciable quantities from side and surface-blown steel. It is impossible for a two-ton converter to compete in cost of production with large sized bottom-blown or open-hearth furnaces. There are, however, cases where it seems to me advisable to make ingots in that way. When charcoal pig iron is not remelted but taken direct from a blast furnace in batches of two to three tons and when silicon does not exceed one percent, the blows in the converter are sometimes troubled with spitting and the steel is not quiet enough in the molds. It seems to me well to raise the heat in the converter by burning the carbonic monoxide and to keep the metal less agitated. For well known reasons it is not desirable to pour the steel too hot in cast iron molds for ingots, but this could be regulated by adding cold steel scrap in the converter. The last named conditions fit many of the Bessemer works in Sweden, but I am not prepared to advance this as a definite opinion before all conditions as to economy are known.

Hard Steel—As far as I know the bulk of the side and surface blown steel has carbon not above 0.25 percent. I have not heard of any instance where higher is produced in that way by breaking off the process earlier, but there are some cases where recarburization is accomplished by additions after the blow for such purposes as spring and common tool steel.

Uniformity in Chemical Analysis.

It has been claimed that side-blown steel runs more uniform in composition than open-hearth steel. I give here below some comparing analyses of steel castings made by the acid process, the figures reported being taken from consecutive charges and not selected:

	OPEN-HEARTH STEEL, NEWARK, N. J. Crucible Steel Co. of America.								SIDE-BLOWN STEEL, ST. PAUL, MINN. American Hoist & Derrick Co.							
C.,	.31	.26	.21	.26	.33	.40	.41	.41	.27	.28	.26	.28	.24	.24	.24	.25
Mn.,	.47	.74	.45	.74	.75	.74	.55	.56	.78	.81	.76	.76	.97	.78	.82	.75
Si.,	.25	.28	.22	.25	.28	.34	.30	.28	.25	.28	.23	.29	.26	.23	.25	.21
P.,	.048	.051	.058	.071	.025	.060	.058	.045	.051	.050	.049	.051	.048	.053	.052	.045
S.,	.027	.027	.030	.054	.030	.050	.036	.028	.034	.039	.033	.037	.024	.033	.039	.039

It will thus be seen that the carbon is somewhat more uniform in the side-blown steel but that otherwise the variations in the elements are about the same. The high and variable percentage of manganese comes of course mostly from the addition of ferro-manganese.

A metal free from manganese, for electrical purposes, can only be produced in side-blown converters by continuing the operation until the carbon is about 0.10%. Steel thus produced has analyzed in average:

Carbon	0.10%
Manganese trace to	0.04%
Silicon	0.02%
Phosphorus	0.04%

Some very mild bottom-blown Bessemer steel has been produced especially at Homestead and Bethlehem Steel Works, the carbon going down as low as even 0.07% and the silicon about 0.010% (in some cases even 0.04%) but the manganese is at the same time up to about 0.40%. The pig iron to be used for the side-blown converters need not contain over 1.5% silicon as so much extra heat is obtained by burning the carbonic oxide inside the converter. This is an advantage considering that silicon is an expensive fuel for the converter. I have recently got an inquiry for Bessemer pig iron of the following composition:

Silicon	1.50 to 2.50
Sulphur not over	0.04
Phosphorus not over	0.04
Manganese about	1.
Total carbon about	4.

It is not stated whether it is intended for side or bottom-blown but there can be no doubt that it is for the latter. The manganese in the side-blown pig iron should not exceed about 0.50% as it would among other things greatly increase the heavy wear of the lining.

Mechanical Properties.

It has been claimed that side-blown steel invariably is absolutely sound and free from blow holes. This ought to be modified so far that the metal is generally sounder than open-hearth or bottom-blown steel; but by wrong manipulation it is quite possible to produce honeycombed steel by side-blow. That it is generally dead molten depends mostly on the great fluidity which allows the gases to escape and not on the fact that no air is driven through it. The results from pulling tests of side-blown steel do not in average indicate any superiority over good open-hearth or bottom-blown steel of same composition. The annealed side-blown steel castings whereof analyses have been given above with carbon 0.24 to 0.28% show mechanical properties whereof the following extracts may give an idea:

Elastic limit	29,350 to 42,900 lbs. per sq. inch.
Ultimate strength	63,800 " 71,900 " " " "
Elongation	38.50% to 28.%

Just as with other steel the annealing and forging improve the mechanical properties. Very good cold-bending tests have been shown of side-blown steel but it has not been demon-

strated that other sound steel of the same composition and treated the same way cannot stand the same tests.

Advantages of the Small Converter.

When the question confronts a manufacturer whether he ought to erect a plant for making side-blown steel, the first thing to be considered is his facility for marketing the products. I have said that for electrical purposes a new metal is produced simultaneously low in carbon and manganese. Outside of that the advantage is not in the quality but in the greater possibilities by obtaining superheated dead molten metal in small quantities. The bottom-blown converter can produce small castings with the first part of the charge but it takes so long to pour out the steel in that way that the metal would be too cold at the end of the pouring and heavy skulls formed. The open-hearth furnace cannot produce steel hot enough for small steel castings without a great deal of expense in refractory material. On account of the high temperature of the metal from side-blown converters it can be poured over the lip from small ladles in the same way as ordinary cast iron from a cupola without leaving much skulls. It has even been found by some steel makers that side-blown steel cannot be tapped from the bottom by a stopper because the lining is cut out from the tap hole.

I quote below literally three advantages from Mr. Bradley Stoughton's valuable paper on the subject:

"The plant of side-blown converters is cheaper to install. The first cost of an open-hearth furnace is much more than that of a converter plant, but thereby has to be taken into consideration, that on account of the length of time necessary to repair a converter with fixed bottom and because these repairs are necessary every 20 heats on the average three vessels must be installed to keep one working continually for at any one time one converter is working one is repairing and the third is drying. A plant of three two-ton converters would thus replace an open-hearth furnace of from 50 to 70 tons daily capacity. The blowing engine and motor are of course much cheaper than for a bottom-blown converter. Any blower of the two impeller type capable of giving the necessary wind may be used.

"The converter may be shut down and started up at short notice. An open-hearth furnace must be run continually to be at all economical, while the chief additional expense of running the converter intermittently is the small amount of fuel to heat up the apparatus before the first blow. This advantage, however, only applies to the following limited classes of manufacturers:

"1. Those who have ample room and prefer to do their work by daylight.

"2. Some cast iron and malleable iron founders, who are frequently called upon to furnish steel castings to good customers, but do not have a large, regular or steady demand. Under these circumstances they are wont to subject such contracts to steel foundries with the result of divided profits and occasional serious delays in delivery or defective castings furnished, for which they are accountable but not directly responsible.

"3. Manufacturers who need a few thousand tons of steel castings a year to put into the product of their own factory, but whose requirements are not large enough to warrant running continuously an open-hearth furnace of economical size. In the United States there are several concerns of this class, who have put in a side-blow converter plant.

"4. Open-hearth foundries which have occasional desirable orders for castings not suitable to open-hearth steel, on account of being small or with thin sections, or with special chemical requirements. Thus a good customer may desire small bevel gears in large quantities, with high carbon to give good wear, or a locomotive works will often send out orders for several large castings together with a number of small ones. To get the desirable work the foundry may take the order and sublet the small work to another foundry at an actual loss to itself, relying on the larger work to make this up and also furnish profit for both parties.

"5. Also in general any foundry expecting fluctuating orders.

"It is better to have a small amount of metal coming to the foundry at frequent intervals:

"1. Because of greater possible variation in chemical composition and consequent elasticity in fulfilling different physical requirements. Each unit of steel must be uniform in chemical composition and with large units it is difficult to fit them exactly to the different orders. It is impossible to divide units into small units, unless the steel is extremely hot, because the steel loses too much heat by radiation on standing or during repouring. This is an advantage of constantly increasing importance with the more extended use of steel castings in many industries. Alloy-steel castings, hard steel for wearing purposes, soft steel for ordinary castings, or extra soft for electrical purposes, are often called for, perhaps all on the same order.

"2. Because of the better arrangement of the work, since the pouring may be done by one gang who do nothing else, and become very expert at it in practice, while the rest of the shop is not interrupted at all in its regular work. When the pouring is done in large units it takes a number of men to do it and the whole shop is more or less interrupted for twenty or thirty minutes, three or more times a day, depending on whether the foundry is served by one of more furnaces. The amount of time lost in this way must be weighed against the wages of the extra men needed for continuous pouring and each shop must strike its own balance. Again, the crane or the apparatus for pouring must be more powerful when pouring in large units. When pouring in small units and continuously, this apparatus is never available for anything but pouring and an extra one must therefore be kept for the purpose.

"3. Because of the smaller floor space required for setting molds. The work of molding, setting, pouring and knocking out can go on continuously in a small space and this is a valuable economy in a foundry."

Having thus mentioned several bright sides of the side-blown steel process, I wish to say a few words about

Disadvantages.

It is well known that several manufacturers have abandoned their plant for making side-blown steel. The reasons generally attributed are waste of metal and of refractory materials. The normal difference of weight between the pig iron charged in the cupola and steel obtained at the mouth of the converters is 14% to 17%. How much of this stands as actual waste in the converter is somewhat uncertain because the melted pig iron is generally not weighed. But the loss in the cupola alone should not be above 5% and the total amount of silicon, carbon and manganese about 6%. The remaining 3% to 6% is of course not much. But at several works the loss of iron amounts to considerably more than 17% and even runs up to 30% continuously for months. It is admitted that more iron is burnt inside the surface-blown converters than in a bottom-blown, which is also evidenced by a greater amount of oxide of iron thrown out in the shape of red smoke. There is also a complaint that the side-blown converter spits more slag and steel than the bottom-blown. This, however, looks doubtful to me and the side-blow charges I have witnessed have been as a general thing absolutely clean. Excessive burning and throwing out of metal depends to a great extent on defective management; for instance, too cold iron, wrong composition of the pig iron; faulty regulation of the blast, burnt-out lining and tuyeres whereby the blast is not delivered in straight well-defined lines, or wrong position of the converter. Altogether it requires more skilled labor and attention, to manage a side-blow than a bottom-blow.

The greater waste of the lining depends on the higher heat, combined with a larger amount of oxidized iron which saturates itself with more silica than resulting from the burning of the silicon in the pig metal. This was of course aggravated in the previous constructions where the side-blow was delivered under the surface, thus giving a rotary motion to the steel. It remains to find a durable lining for side-blow converters. The bottom is more rapidly worn than the sides and recently constructed improved converters therefore have detachable bottoms. By bottom is meant the whole lower part including the tuyeres. This lasts 10 to 20 heats if it is kept in good order, and the superstructure lasts about 40 to 50 heats. By constant patching the lining in the Tropenas converter can last about 150 heats. In bottom-blown converters the bottom lasts about 25 heats and the upper lining 200 to 300. The economy of refractory material of course depends also greatly on the quantity to be renewed. This is larger if the division line between the top and bottom is above than below the trunnions. In the last

named case the bottom part can also be more easily changed. In the bottom-blown converters the interchangeable part constitutes of course a much smaller percentage of the whole, as no part of the sides is attached to the bottom.

Waste of Metal After the Blow.

The waste of metal after the steel has left the converter is caused by three circumstances:

Spattering during the pouring which amounts to 1% to 2%, depending on the sizes of the castings.

Skulls in ladles proportionately to the heat of the metal.

Sinkheads and gates which naturally constitute a larger percentage the smaller the castings are. These can of course be made thiner the hotter and quieter the metal is. The work in getting off the sinkheads is a considerable item in the making of small castings. They cannot be knocked off with a hammer but have to be either sawed off close to the casting or chipped off and the root ground, which is generally more work. This is a drawback in small steel castings by whatever process. The question what to do with all the steel scrap, whereof the sinkheads and gates under normal circumstances constitute the largest proportion, should be carefully considered. When the converter plant is isolated the steel scrap will have to go into the cupola and the amount thus to be consumed will generally have to be limited to 25%. The steel requires more fuel to melt and higher temperature. Besides the pig iron is thereby diluted and the silicon lowered which is the expensive fuel on which the heat in the converter to a great extent depends. Then there is always danger of delivering the pig metal too cold to the converter if too much steel scrap is melted. The amount of scrap from small steel castings can easily exceed 25%, and then the scrap heap in front of the cupola will constantly increase. The excess will have to be disposed of at a loss to open-hearth steel makers. The side-blown converter therefore works to best advantage in conjunction with an open-hearth furnace, which can consume the scrap with expenditure only of coal and labor, leaving the cupola undisturbed for melting the pig iron.

Construction.

I will here only refer to those converters which are in practical use, leaving the others to be mentioned in the historical sketch. As far as I have been able to ascertain, side-blow steel is only made in America by the following three processes:

The Tropenas converter has a double row of tuyeres, the upper one being intended to burn the carbon oxide inside the converter, thus increasing the heat. The tuyeres are either parallel or converging towards a point beyond the center of the converter. The upper or combustion tuyeres are rectangular or oval with the large axis horizontal. Both rows of tuyeres pass through a projecting ledge in the lining of larger diameter than the converter itself and are intended to check the rotation of the steel. The distance between the rows is 4 to 7 inches. The diameter of the lower tuyeres is 1.25 to 2 inches according to the size of the charge. One object of the tuyeres being laid in such a concave ledge is that in case of the metal running into the outer longer ones, warning will thereby be given before all are stopped up. The lower part of the converter is conical for one ton and cylindrical for larger sizes. The bottom is fixed and the relining is done through a manhole. As above mentioned it is thus necessary for continuous operation to have three converters, one for repair, one to be dried and one in operation.

The long tuyere modification as built by Mr. B. Stoughton has only one row of parallel tuyeres 1½ to 2 inches placed in the flat side of the converter. The constructor has the view that a better result can be obtained by burning the carbonic oxide close to the surface of the metal bath and 4 inches to 7 inches above, as in the Tropenas construction and that this can be accomplished by only one row of tuyeres. He also found that the second upper row, unless very carefully watched, is liable to furnish excess of air representing loss of blowing power and loss of heat by cooling. The tuyeres are made by iron pipes rammed into the lining, the ends projecting about 6 inches into the wind box. The distance between the tuyeres and the mouth is increased about 50% over that of Tropenas construction in order to reduce the loss by spitting. The lowest part is detachable whereby only one, at most two, converters are needed as the bottoms give out earlier than the superstructure. Both of the said converters revolve in the ordinary way on trunnions through which the blast is delivered.

The third of the side-blow converter type in active operation is the Evans-Wills, delivering the blast through flexible pipes and having the turning center below the bottom of the converter. The lower part with the wind box attached is removable from the superstructure and placed on wheels. After the blow it is rolled away and used as a ladle for casting in different places. A hole in the upper edge serves to rake out part of the slag.

In all side and surface-blown converters the diameter and the depth under the tuyeres should not exceed certain limits if the action is to be thorough. I lay special stress on this because there are parties here who have spent lots of money and suffered agony of mind before they found out that the only trouble was too great depth of the metal bath. Makers of small castings have generally stopped at 2-ton converters, but larger ones are contemplated. As it is not safe to increase the depth or diameter, the only dimension which could be extended is the width, making the cross section elliptical and giving the converter room for more tuyeres. This, however, has to be. The cupola melting the pig iron is either on the ground, when the liquid metal has to be lifted by an elevator to the mouth of the converter, or the metal may run down from the cupola to reach the converter. In the former case the advantage is gained that the pig iron can be weighed and sample taken to find out whether the pig metal after being melted is suitable for the blow. But on the other hand one more elevator has to be furnished which is more expensive than to elevate the raw materials for the cupola a few feet higher, and the pig metal loses some heat by being poured in a ladle.

As the blast pressure is only 4 lb. per sq. inch and it is the question of volume and not pressure an ordinary blower with ordinary twin impellers can be used for cupola and converter alike. The power required is about 1-10 of that for bottom-blown converters.

Operation.

As it is important that the blast should be delivered in an acute angle just above the surface of the metal the quantity poured into the converter will have to be regulated accurately (in a bottom-blown converter, of course, no attention needs to be paid to this). After the filling the converter has to be placed just in the right angle by turning the wheel of the gear, opening the back of the wind box and looking through the tuyeres. The blast ought to strike the metal about half way across and be delivered in well-directed parallel currents. Irregularity in that respect will cause more spitting. During the first period, 25 to 30 percent of the whole, only sparks and red smoke appears, the last named from oxide of iron showing up to a greater extent than in a bottom-blown converter. The liquid metal is not at rest but has the rotary motion of a wave and the action can therefore only extend to a certain depth. As in all converting processes the basic silicate of iron first formed acts on the carbon, thereby forming carbonic oxide, which helps to keep the metal in motion although of course the agitation is much less than in converters where the air comes in under the surface of the metal. As the flame becomes white and strong during the boiling, the blast pressure is reduced to 3 or 3½ lb. and the converter is tilted slightly backward. During this boiling period, about one-third of the blow, there is no red smoke. Then the flame drops. Whenever the flame is short, red smoke appears. The spitting is worst towards the end of the boiling period. Then the flame lengthens a second time and becomes clear and white, until the final drop at the end of the blow, during which last period full blast is turned on. If spitting occurs during the last period, there is something wrong in the lining, the tuyeres or the position of the converter. The blow of two tons lasts about 20 minutes. Analyses of the escaping gases show about the following proportions:

	CO	CO_2
4 minutes from beginning	0.	8.2
10 minutes from beginning boiling	0.30	24.3
12 minutes from beginning boiling	0.40	8.8
17 minutes from beginning shortened flame	10.70	12.
21 minutes from beginning end.		

Corresponding analyses of gases from a bottom blown converter have appeared as follows:

	CO	CO_2
4 minutes from beginning	3.95	8.59
10 minutes from beginning	19.59	3.58

14 minutes from beginning	31.11	1.34
18 minutes from beginning, end.		

It will thus be seen that in the side-blow the carbonic oxide is well oxidized during the boiling; after that it is increasing until the end of the blow. At the late period when about 10 percent each of carbonic oxide and carbonic acid appear, there is also about 7 percent free oxygen. This depends on the inaction of the carbonic acid during the excessive heat and of course no amount of extra air would then burn the carbonic oxide. This also accounts for the apparent anomaly that the flame at the end of the blow is at least just as long as in a bottom-blown converter for the same carbon. The analyses of gases from the last named show a steadily increasing amount of carbonic oxide. These circumstances make it more difficult to determine the carbon by the appearance of the flame in a side-blow converter. But this is simplified because as far as I know the bulk of the side-blown steel has either 0.25% or 0.10% carbon. Although the economy of heat in the converters has been several times exposed I think it would be of interest in connection with this matter to repeat some of the figures.

The units of heat (that is the multiples of heat needed to raise 1 lb. of water one degree) developed by the combustion are as follows:

Hydrogen	34,462
Silicon	7,830
Iron	1,650
Carbon to carbon monoxide	2,474
Carbon monoxide to carbonic oxide	2,403
Carbon to carbonic acid	8,080

The silicon therefore gives a considerable amount of heat which stays in the metal, the product being liquid. The iron gives some heat in burning but this to a great extent is taken back when the iron oxide is dissolved in contact with the carbon. Some heat must also be developed by the oxidation of manganese and by the combination of the silica with the oxides, although I have never seen an estimate of the last named. The oxidation of the carbon to carbon monoxide in the metal bath gives 2,474 units of heat per unit of carbon. But only part of this is given to the steel because the product of combustion takes flight and carries away the bulk of the heat from that source. By burning the carbonic monoxide outside the metal bath and inside the converter additional heat is obtained to the extent of 2,403 units of heat per unit of carbonic monoxide. But inasmuch as 1 unit of carbon corresponds to 7-3 units of carbonic monoxide the additional heat thus gained referred to the unit of carbon in the pig iron will be $7\text{-}3 \times 2{,}403 = 5{,}607$ units. This is quite a considerable increase, but only a limited amount of this is imparted to the steel, the bulk of the hot gases instantly leaving the converter. The result would be better if it were possible to construct a converter in such a way that the gas currents above the metal bath would not be so rapid. Although the metal is very hot and liquid it is well to add some ferromanganese to be sure of absolutely quiet steel before casting. The slag must, of course, be removed more carefully in casting over lip. In the Evans-Wills converter it is raked out through a side hole in the detachable underpart. In some operations with ordinary side-blow converters sand is shoveled in through the mouth of the turned down converter after the blow thus forming a tough slag as a cover, which does not follow the steel. A dam with fire bricks is then formed and the steel is tapped through the lowest part of the mouth.

Historical.

The practical value of the historical part is to show what constructions are out-dated and hence should be avoided. I say this, knowing that patents have been taken out and methods started which are simply reversions to antiquated systems.

In 1856 Sir Henry Bessemer made the first steel produced by blowing air through pig iron. The priority was disputed some years ago by an American but the claim does not seem to have been sustained. It has also been asserted that the process was in secret operation at Essen in Germany for some years before 1856. The first converter was stationary, cylindrical, with radial side tuyeres near and parallel to the bottom. The pig metal was poured in through a hopper on the side. The flame escaped through a central hole in the top. Sir Henry Bessemer anticipated by patents many ideas which were afterward taken up by others as original.

The development of the process was soon afterwards transferred to Sweden and I have a description of the first converter in that country. It had horizontal tuyeres near the bottom inclined so as to give a rotary motion to the metal.

In 1863 a stationary converter was erected in America but later was abandoned. Soon afterwards the movable converters with bottom tuyeres came into general use.

In 1879 the steel-making world was profoundly stirred by the Thomas Gilchrist process of dephosphorizing in basic lined converters. I then made the personal acquaintance of Mr. Sidney Thomas and he gave me two patent letters, in one of which he anticipated the construction given above of iron pipes projecting outside the lining. He asked me whether there were any stationary converters left in Sweden. The object of that question became apparent in 1882 when he had constructed a side-blow converter on elliptical rockers so as to make the motion easy. He then says that it can be so tilted that some of the tuyeres are above the surface, thus burning the carbonic oxide gas inside the converter. The idea of doing this was, however, anticipated a few years before by some American bottom-blown converters being so inclined during part of the blow that some of the tuyeres were above the surface.

In 1884 Messrs. Clapp and Griffith received the stationary converters, such a plant being installed in Pittsburg. The novelties were a special arrangement to plug up the tuyeres from outside and a side hole through which the slag could be removed. Great improvements, especially lower silicon in the steel, were promised but it has been shown that however much slag is drawn there always remains more than enough to raise the silicon in the steel should a reduction of silica take place, which is hardly probable in a pre-eminently oxidizing process. But oxide of iron is removed during the boiling period and by withdrawing the slag at an early stage the waste is therefore increased. As the claims of superior metal were not sustained and with all the inconveniences of stationary converters against them the Clapp-Griffith process was gradually abandoned in America.

All subsequent side-blow converters were movable on trunnions. The development in that direction has to a great extent been made by Frenchmen.

In 1884 Messrs. Walrand and Delattre built the first known converter of this kind at Stenay, near Paris. The first construction had tuyeres on one side inclined downwards and slanting so as to give a rotary motion according to the first Swedish principle above indicated. By this construction good steel castings were obtained.

In 1885 M. Robert, then manager of the Stenay Works, flattened the back, made the tuyeres parallel to the bottom but slanting so as to give a rotary movement. They were also moved up close to the surface of the bath whereby enough gas escaped to burn the carbonic oxide. This gave good results and the process was practically conducted as above described.

In 1889 Alexander Tropenas built a Robert-Bessemer plant for Messrs. Berges in Paris. He gave up the process as too wasteful and moved to Sheffield where the firm of Edgar Allen & Co. in 1891-92 developed his process as above with slightly concave back, nearly parallel tuyeres, and especially the upper row of combustion tuyeres which is really the only novel patentable feature. The original Robert converters have gradually grown less in numbers in America and the prevailing construction is now Tropenas, as described above.

As above mentioned, steel castings can be made from bottom blown converters, and some very good articles thus produced were exhibited at the World's Fair in Chicago, by the Solid Steel Co., Alliance, O. In order to better preserve the heat the bottom-blown converters are in some places made portable, either hanging in a crane or placed on wheels and the casting made direct from them. But it is obviously awkward to handle such a heavy weight and rather difficult to regulate the pouring exactly for each mold, as well as to keep away the slag.

I have only mentioned those converters that have been or are in actual use. There are several other inventions for the same purposes which are buried in the patent office. I have made a collection of some of these.

Looking back on the many devices it seems almost impos-

sible to get any more improvements in the same direction patented. The idea of burning carbonic oxide inside the converter to increase the heat is about 25 years old and as above stated the first converter in 1856 had side tuyeres. Practically all that has been done during that long period is the arrangement of the side tuyeres and it is therefore rather strange that the progress has been so slow. The history shows the usual contests between patentees and the lack of consideration most inventors show towards their predecessors who served for foundation for the progress and sacrificed money and time on the development.

We have been taken by so many surprises that it is impossible to tell what the future will bring. It seems to me that a part of the off-going heat could in some way be utilized to heat the blast, also that additions of ferro-silicon during the blow are not sufficiently tried. Some small converters are in use for melting pig iron for malleable castings and for brass, in which a flame generated by a spray of petroleum is used. Perhaps under certain circumstances some addition of heat in this shape during side-blows for steel making would be economical, thereby permitting a lower silicon pig iron. It is also possible that a small open-hearth tipping furnace may be invented for the same purpose as the side-blow converters, with facilities for raising the heat, and with lining refractory enough to withstand it.

In conclusion I may say that in a very few years from now, there will probably be much more to be said on this subject.

Discussion.

A short discussion then followed:

H. O. Evans.—I notice the waste of iron is given as running from 17 to 30 percent. What should be the commercial waste?

Mr. Lilienberg.—It should not be more than 17 percent. Frequently a much larger loss is made, due in nearly every case to mismanagement.

Mr. Evans.—Then 17 to 20 percent would represent good practice? The loss would also, I suppose, depend upon the nature of the castings and their sizes.

Mr. Lilienberg.—I spoke of the waste in the iron during conversion.

Mr. Flagg.—Some time ago I had experience with a side-blow converter, but could never get down to the actual losses. Whatever loss I suggested was always agreed to. I never could determine what the actual loss was.

Mr. Deemer.—Mr. Lilienberg states that only 25 percent of scrap can be used. We can use as high as 75 percent and still get good castings. I mean our own scrap. Of course we cannot make enough to supply our wants and we have to utilize other scrap when we want to use that quantity.

Mr. Lilienberg.—Have you an additional expense for coke to melt that scrap?

Mr. Deemer.—No. We can put a casting weighing a ton in the cupola and melt it, if necessary, and without any extra fuel expense.

Mr. Simonson.—I enjoyed the reading of the paper very much, and think it covered the ground thoroughly. My experience has been that good castings may be made by any of these processes. Whether you can do so more economically with one than with another is a matter one must decide for one's self. Castings are being made by the Tropenas process today better than before, on account of the longer and better experience. The amount of good castings to be obtained would depend entirely on the type of castings.

Mr. Barba.—The statement was made that the linings lasted a certain number of heats. How were the experiments on the linings conducted? What linings were found good, and what bad? It is not feasible to stop a converter after, say 20 heats, and put in a new lining. I should like to know whether there is any plan adapted to extend the life of linings. My experience concerns mainly up to 75-ton charges, and of course I know what can be done under such circumstances.

Mr. Lilienberg.—As far as I know it depends very much on the material used. When I spoke of the number of charges made in experiments they were within my own knowledge.

Mr. Deemer.—We all have our own ideas on the subject of linings. Experiment is best. If one lining does not answer try another. We get about 70 heats to a lining.

Mr. Simonson.—My experience is that silica brick should first be used for linings, and afterwards ganister. You can probably make better ganister than you can buy. In this way you can get a converter to run 1,000 heats before relining is necessary. Heats of two tons I speak of.

High Silicon and High Carbon Facings.

The Quiz Class presented a question: "Does high silica facing resist the action of the hot steel in making steel castings to a greater extent than a high carbon facing?" Replying to the question Secretary Evans read a letter from Bradley Stoughton in which he said: "It does; and further, high carbon facing sometimes makes blisters on the surface of steel castings where carelessly applied."

Counterweight Castings for Cincinnati Water Works.

The Cincinnati Waterworks Commissioners on Tuesday, Jan. 12, awarded to the Bollman-Wilson Foundry Co., of Cincinnati, the contract for the castings required for the construction of the counterbalance weight in the pump pit of the Eastern pumping station of the Cincinnati Waterworks. The total weight of the castings required is 4,200 tons and the contract price is $72,870 or $17.35 per ton. The engineer's estimate of the cost was $84,000 or $20 per ton. The other bidders were: Ross-Mehan Foundry Co., Chattanooga, $20; United Engineering & Foundry Co., Pittsburg, $22.19; W. J. Gawne Co., Cleveland, $22.20; J. H. Dimmick & Co., Birmingham, $24.30; Marshall Foundry Co., Pittsburg, $20.85; United States Cast Iron Pipe & Foundry Co., Cincinnati, $25; Eureka Foundry Co., Allegheny, $18.45; Buffalo Foundry Co., $19.50.

The Bollman-Wilson Foundry Co. is reported to have purchased 3,000 tons of gray forge iron at $8.25 Birmingham, which it is assumed is to be used on this contract.

To Manufacture "Malleable Steel" Castings.

The organization of the United States Hardware Co. is announced and Port Clinton, O., has been selected as the location of the new industry. Geo. F. Eberhard, of San Francisco, president of the Geo. F. Eberhard Co., of that city, and formerly superintendent of the Eberhard Mfg. Co., of Cleveland, which company he formed, is now in New York completing the organization of the new company. He has secured the sole right from the Thomson Electric Welding Co., original inventor and patentee of processes referred to, Mr. Eberhard being the inventor and patentee of the new goods and special machinery to be employed in their manufacture. Since 1894 Mr. Eberhard has been experimenting with new machinery for the manufacture of hardware, and now announces that the developments in the use of soft steel together with the improvements in machinery in general have opened the way for the new industry, which is based on the value of a lighter, stronger and more economical material than malleable iron for the castings entering into the manufacture of harness, carriages, wagons, railway and street cars, furniture, implements, buildings—the whole field into which malleable goods enter. In perfecting methods for producing steel castings Mr. Eberhard has been assisted by P. J. Martin, who will supervise the foundry department of the United States Hardware Mfg. Co. This department will be known as the Ohio Malleable Steel Castings Co. Mr. Martin was for a number of years general superintendent of the Eberhard Mfg. Co.'s malleable iron foundries at Cleveland.

Harness hardware will be a specialty of the new company, and in addition the product will include tent, ship upholstery, car, vehicle and house furnishing hardware. The art of electric welding which will be employed was the invention of Elihu Thomson, and the Thomson Electric Welding Co. is lessor. Tests have showed, in welding steel by Mr. Eberhard's formula, that the joined parts stand a higher test of tensile strength than the original wire. On account of the large quantity of each article produced, special machinery is employed for automatically feeding, forming and electric welding the wire, delivering the articles from the machines almost ready for enameling or plating. Thus it will be possible to produce rings from coil bright wire ready to be packed in paper boxes to be shipped to the trade without hand labor being employed. Referring to the single item of wire rings Mr. Eberhard says that statistics show there are consumed in the United States over 3,500 gross or over 500,000 rings per day; 3,000 pairs of iron hames and 8,000 pairs of wood hames per day. It is expected to have the Port Clinton, O., plant finished and in operation within six months.

THE HEALD WET GRINDER.

A wet grinder has been designed and given a thorough trial during the past two years in the plant of the Heald Machine Co., now of Worcester, Mass., and formerly of Barre in that State. The grinder has stood the test of this experience and is now to be put upon the market for grinding formed cutters, gear cutters, hobes, taps, forming tools, etc. It has been the experience of the company that cutters ground on a dry wheel would frequently fail to stand up to the work as well as would be desired even when the greatest care was taken with the grinding. The conclusion was unmistakable that only in doing the grinding in the presence of an abundance of water was the satisfactory solution to the situation and there could then be no chance of overheating the cutting edge when grinding off the relatively large amount necessary in cutters of this class.

The result of the investigation is embodied in the machine illustrated and this will now be manufactured for the benefit of others interested in increasing the production and lengthening the effective life of cutters. Some attention has been paid in the design of the machine to the important matter of

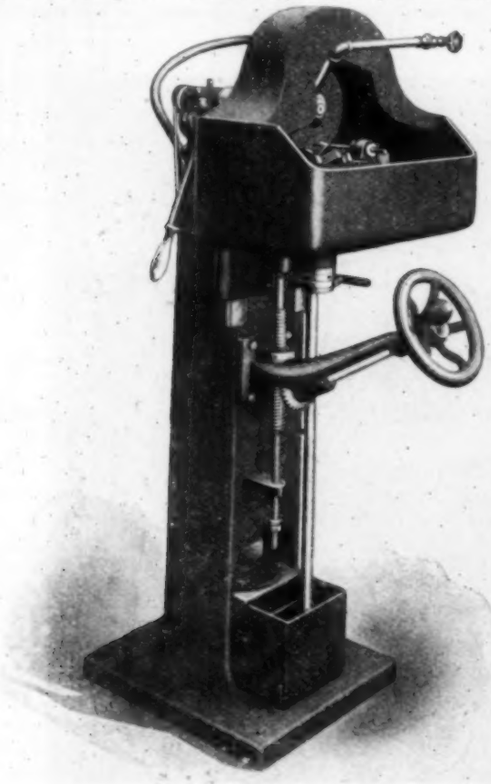


FIG. 1.—A NEW WET GRINDER FOR FORMED CUTTERS, ETC.

reducing the time required for setting up and adjusting the work, a task which is often a very large proportion of the time required for completing the operation on the tool. This improvement also applies to the lessened period requisite in the adjustment of jigs and fixtures when cutters are changed seldom, an advantage in the cutting qualities of the cutter also cutting down the time in resetting, etc., the cutter that will finish more pieces before regrinding paying high interest on the investment in improved cutting conditions.

The machine, Figs. 1 and 2, has a base and column with a grinding wheel mounted in a double carriage at the top, and a square trough shaped casting adjustable up and down on the front of the column in which the work holder is carried. The wheel is traveled through the work by the hand lever at the side of the column, and is raised and lowered by the hand wheel and screw which gives a quick and accurate adjustment of the work to the wheel. The base of the column contains a water tank with a centrifugal pump furnishing an abundant supply of water to the work. Ample water guards are provided to keep the water where it belongs and the other parts dry and in good condition.

The work holder is simple but universal in range and will hold both straight and taper spindles, right and left hand cutters either straight or angular, flat forming tools, threading cutters, etc., which are ground on their faces in sharpening. This machine has also been fitted with an attachment for grinding lathe and planer tools to standard angles and with

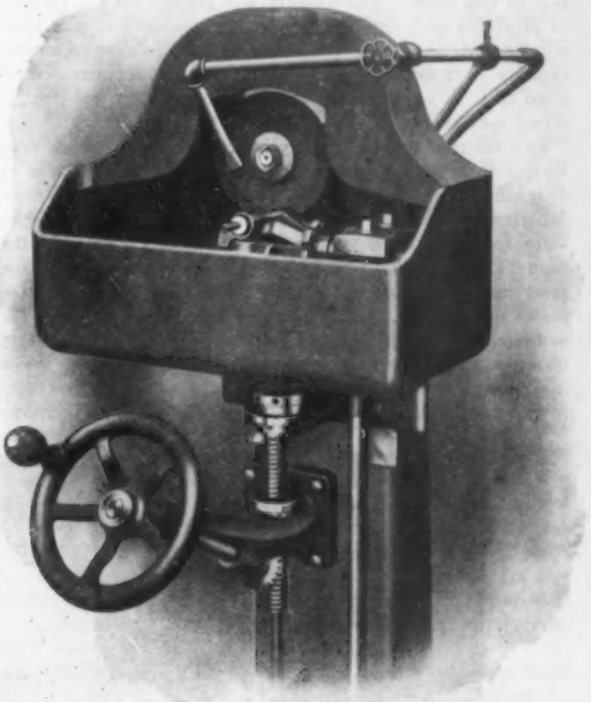


FIG. 2.—WET GRINDER AT WORK ON LARGE FORMED CUTTER.

proper clearance. The construction is shown in the halftone Fig. 3 and consists of an L-shaped casting which will swivel on the base to any angle and carries a tool holding spool which will also turn about the axis of the tool, the two adjustments giving practically any setting needed for such work and in a very simple manner.

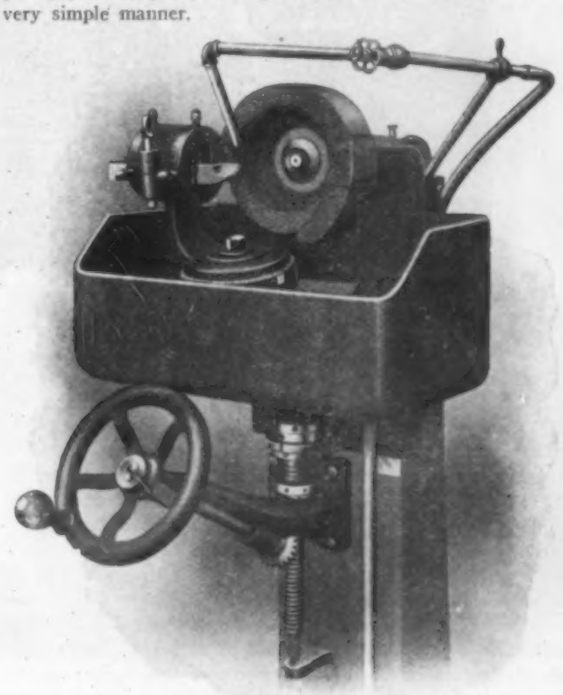


FIG. 3.—WET GRINDER WITH ATTACHMENT FOR GRINDING LATHE TOOLS.

The machine is made in three styles: First, for milling cutters and similar tools; second, for cutters and with the lathe and planer tool grinding attachment, and third, as in Fig. 3, for lathe and planer tools only.

A Modern German Foundry.

Oscar Leyde, of Berlin, describes in *Stahl und Eisen*, the foundry of Ludw. Loewe & Co., of Berlin, Germany, and we reproduce the description and illustrations through the courtesy of that paper. The foundry was erected for the purpose of providing gray iron castings for its machine tool and electrical departments. The plant was designed to have an annual capacity of 2,500 tons, and this output can be increased to 4,500 tons, as the demands of the tool and electrical departments increase.

Raw material for the foundry is deposited in the stock yard located in the northeast end of the plant, from which it is distributed over an industrial railway system to the various departments, the coke and iron being transported to the elevator to be deposited on the cupola charging floor, and the sand being carried to the molders, coremakers and to the sand mixing department. The cupolas are located in the center of the plant, from which the iron is distributed to the molding floors. The castings are then carried in a westerly direction to the cleaning room and from the cleaning room they take a southwesterly course to the shipping room, the entire plant being laid out with a view of having the material take a diagonal course through the plant, from the northeast to the southwest, the machine department of Ludw. Loewe & Co., for whom nearly all the castings are made, being located south of the foundry.

FIG. 1.—GENERAL VIEW OF A MODERN GERMAN FOUNDRY.

The foundry consists of four buildings, each 15m (49 feet) wide, the two located on the north and south respectively being 70m (230 feet) long and the two located between these buildings being 30m (98 feet) long. Each building is provided with craneways to carry two cranes of 15 tons capacity each, so that they can be transferred as desired according to the work at hand from one building to another. The main north building has a lean-to 30m (98 feet) long and 10m (33 feet) wide for offices, lavatories and pattern shop; on the west side of this building there is a lean-to 70m (230 feet) long and 10m (33 feet) wide for the cleaning and grinding departments; the main building in the southerly end of the plant has a lean-to 70m (230 feet) long and 10m (33 feet) wide, containing the shipping room, molding floor for small castings, lavatories, sand grinding department and carpenter shop, while two other lean-tos, each 30m (98 feet) long and 7.5m (25 feet) wide contain the drying rooms and small core department. In the center of the plant, in a space 30m (98 feet) long and 10m (33 feet) wide, are located the cupolas, engine room, closets and a small store room.

Cupolas.

Owing to the variety of castings required for the machine tool and electrical machinery department, both in size and quality, a number of cupolas of different capacities had to be installed. The plans call for two cupolas of 100cm (40 inches), two of 80cm (31½ inches) and two of 60cm (23½ inches) capacity, inside measurement, of which two of 100cm and one of 80cm and one of 60cm have been installed. The two large cupolas provide iron for the molding floor located in the main south building, while the medium sized cupola provides iron for the northerly section and the small cupola provides iron for the molding floors located in the center of the plant. The number and sizes of the cupolas have proved an excellent arrangement, inasmuch as the output has often reached 40 tons daily, when three of the cupolas would be in use, while there have been occasions when only three or four tons were cast and only one cupola was in use. There have been occasions when as high as six and even more mixtures were required for the day's cast and the four cupolas proved none too many. Two cupolas are generally in operation every day.

The cupola charging floors of the larger cupolas are 6.5m (21 feet) in height from the ground, that of the smaller cupolas 5.5m (18 feet). The stacks of the larger cupolas are 5m (16½ feet) high, that of the medium sized cupola 4m (13 feet) and that of the small cupolas 4.1m. A 25m (82 foot) smokestack has been provided for the two cupolas which are to be installed in the future, and this is provided with a spark-catcher. The cupolas were installed by Krigar & Ihssen, of Hanover, Germany, and have been kept in constant operation without the replacement of many of the tuyeres. The gauge on the cupolas does not indicate the blast pressure in the air pipes or in the air reservoir, before it passes the tuyeres, but indicates the pressure in the cupola, dependent, of course, upon the charge and its working. The blast is furnished by three Sturtevant fans, a No. 7 for the large cupolas and two No. 6 for the smaller ones. The fans operate at the rate of 2,000 to 2,700 revolutions per minute and provide a blast pressure indicated by a water gauge of 55cm (21½ inches) for the larger cupolas and from 42 to 47cm (16½ to 18½ inches) in the smaller cupolas. When making large casts the large fan provides blast for both large cupolas at the same time, giving sufficient hot iron with a blast pressure of 30 to 36cm (12 to 14

inches) as indicated on a water gauge. Under these circumstances the large cupolas provided only 4.5 tons of iron per hour, as compared with 5.5 tons when the large fan is operating on only one of the large cupolas. The medium sized cupolas deliver 3.5 to 4 tons per hour and the smaller cupolas from 2.5 to 3 tons. The three fans are operated by electric motors, the largest one is operated by a motor of 30 h. p. and the smaller ones by motors of 15 h. p. capacity.

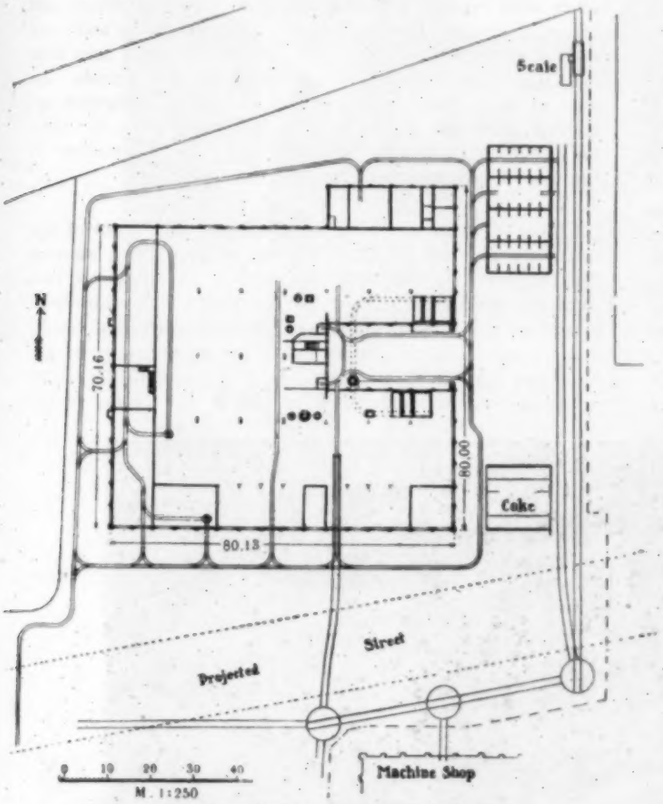


FIG. 2.—GENERAL PLAN OF FOUNDRY.

The charges of the three different sized cupolas consist of 800, 500 and 300 kg (1,860, 1,100 and 660 pounds) of pig iron respectively, while the coke charged for the three is 450, 450 and 300 kg (205, 205 and 136 pounds) respectively.

Molding and Handling Equipment.

As most of the work is done in wet sand, and dried molds are not used extensively, the drying and core ovens are of the simplest possible design. They are fired from the outside and have one flue which is provided with a smoke stack 20m (65 feet) high. The foundations have also been laid for the erection of another stack.

A sand sifting machine and a sand mixer operated by an electric motor are provided to prepare the sand. Most of the molding is done in green sand from patterns, but some molds are made with a sweep. Molding machines are used for duplicate work, eight pairs of Hillerscheidt and one Pridmore molding machine being in daily operation.

The cleaning is done with sand blast, tumbling barrels and emery wheels, and the smaller castings are cleaned with excellent success by pickling, this process giving an elegant finish to the castings. An exhaust fan keeps the cleaning room practically free from dust and flying particles.

As castings up to 15 tons in weight are cast for the electrical department, traveling cranes had to be provided to handle the material with dispatch. Two electric traveling cranes have been installed to command the main molding floor of 15 and 10 tons capacity respectively; the large building located in the north end of the plant is commanded by two electric cranes of 3 and 5 tons capacity. The Shaw company installed five of these cranes. The industrial railway system which is used for carrying material to various portions of the foundry was installed by the C. W. Hunt Co., and gives excellent service. A standard gauge track leads into the south building.

Heating System and Sanitary Arrangement.

The problem of heating the foundry was given much thought. Owing to the large number of windows in the plant, making an extensive cooling surface in the winter time, an extraordinary large heating plant had to be installed. Warm air is delivered into the foundry by two Sturtevant fans 3m (9.75 feet) in diameter each, which has operated by an electric motor of 20 h. p. capacity. The warm air travels from the west end of the plant to the eastern portion and additional heat is furnished in the latter section by the core ovens. While pouring in the afternoon, the heating system is not in operation. On cold days the heating system is placed in operation early in the morning, so that the entire plant will be comfortably heated at 7 o'clock, when the employes begin work.

An extensive wash room has also been provided, located in the cellar underneath the west lean-to. In this room each employe has his locker, which is made of wire and well aired, the wash bowls being located between the rows of lockers and are filled with warm water when the men quit work in the evening. Twenty-four shower baths are provided in a separate room at the disposal of the molders and other employes. On an average, 35 percent of the employes utilize these shower baths every day in the year, while in the summer time as many as 80 percent of the employes took advantage of them. Thirty closets are provided for every 300 employes despite the fact that the Government only requires 20 for this number.

Water is provided for all purposes except drinking from the company's own plant, the city water being provided for drinking purposes. For power purposes the electric plant delivers a 500-volt direct-current and 110 volts is provided for lighting purposes. Gas from the municipal gas plant is held in reserve for lighting.

Laboratory Work.

A laboratory is provided for making chemical and physical tests, none of the pig iron being purchased without a guaranteed analysis and scrap is not purchased very often without a trial analysis. Coke must also be guaranteed as to analysis. In addition to the guaranteed analysis, tests are made of every car of iron delivered, borings being taken from 10 separate

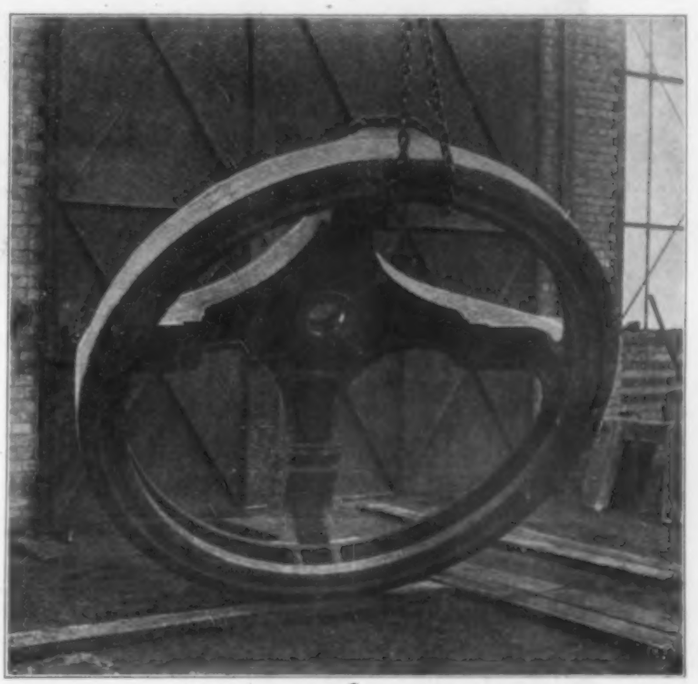


FIG 3.—CASTING MADE WITH A SWEEP.

pigs. Tests are also made of every cast. As the quality of the iron delivered by the furnaces is bound to vary from time to time, iron from different cars and also various brands are used to average up the mixtures.

In making thin castings the contents of silicon vary from 1 to 3 percent and should a casting containing 2.3 percent silicon be required, iron containing the following analysis would have to be averaged:

	Silicon.	Sulphur.	Manganese.	Phosphorus.
Own scrap	2.20	.120	.70	.80
Outside scrap	2.15	.130	.50	1.20
Soft hematite iron	3.56	.028	.90	.22
Hard hematite iron	1.80	.025	1.20	.18
Addition of No. 3	2.65	.045	.50	1.55

As about .20 percent of the silicon is lost in melting in order to secure a casting containing 2.3 percent silicon, a mixture containing 2.5 percent of silicon must be used. Considering the cost of the pig iron and the content of phosphorus it may be desirable to have the mixture contain 50 percent of scrap, of which 35 percent made in the plant is at hand and 15 percent of outside scrap must be used. Should 25 percent of a cheaper No. 3 iron be used the remaining 25 percent of the mixture should be made up of hematite containing a high percentage of silicon. Therefore in order to secure a casting containing 2.3 percent of silicon, the mixture should be made up as follows:

	Silicon	Sulphur	Manganese	Phosphor's
35 per cent own scrap...	(2.20) 0.77	(0.120) .042	(0.7) 0.25	(8.80) 0.28
15 " outside " ...	(2.15) 0.32	(0.130) .019	(0.5) 0.07	(1.20) 0.18
17 " soft hematite	(3.56) 0.62	(0.028) .005	(0.9) 0.15	(0.22) 0.04
8 " hard "	(1.80) 0.14	(0.025) .002	(1.2) 0.10	(0.18) 0.04
25 " No. 3.....	(2.65) 0.66	(0.045) .011	(0.5) 0.12	(1.55) 0.39
100 per cent	2.50	0.07	0.69	0.90

The mixtures to achieve various results are now practically fixed and chemical analyses are only made from time to time for the purpose of controlling the same, or when a casting turns out bad and the mixture is believed to be the cause. On the other hand test bars are taken from every cast for the purpose of ascertaining the physical properties. Bars are taken for ascertaining the tensile strength, chill and shrinkage, and especially constructed boring machine with diagram indicator shows the degree of hardness of the test bar.

The question of ascertaining the costs is one of great importance, as very few of the larger castings are in duplicate, and while the majority of the castings are made for the company's own use, some job work is also taken in. Furthermore, the actual cost of making large castings ranges from 11 to 12 marks per 100 kg ($2.62 to $2.85 per 220 pounds), while on the other hand castings for complicated automobile cylinders and others of unusual difficulty run up to the 100 marks and over per 100 kg ($23.80 per 220 pounds); it can be readily seen how hard it is to arrive at an average price to secure a profit. In view of these difficulties the cost of all castings is figured according to weight on the basis of a standard price for iron, the latter naturally varying according to the fluctuations in the cost of raw material.

Chicago Pneumatic Tool Co. directors have reduced the quarterly divident to three-fourths of 1 percent, against 1¾ the previous quarter and 2 percent the previous two quarters, making 6 percent for the year. In a statement issued by the directors it is said that the unsettled condition of the industrial situation was an influence in its action, and that the financing of the new plant on the Clyde was being done from current earnings. The profits of the company are declared to be larger than the previous year and a statement will be issued in two weeks covering the fiscal year's operations. It is announced that the declaration is not indicative of permanency, that in the future declarations will be based upon profits and with respect to industrial conditions.

FIG. 4.—A LARGE MOLD FROM PATTERNS.

J. G. Butler, Youngstown, chairman of the Bessemer Pig Iron Association, has made the following official announcement on pig iron production: On Jan. 1, 1904, of the 155 furnaces tributary to the Lake Superior ore region, including Johnstown, Pittsburg, Wheeling, the Mahoning and Shenango valleys, Cleveland, Columbus and the Southern Ohio districts, with an average daily capacity of 37,000 tons or an annual capacity of 13,000,000 tons, 53 stacks were in blast and 102 out of blast. The idle capacity was 65 percent.

The business of the Gibson Iron Works, Edward Gibson, proprietor, Jersey City, with all its assets and liabilities, has been transferred to the newly incorporated firm of Gibson Iron Works Co.

IRON AND STEEL RAILS IN WESTERN PENNSYLVANIA.

General Manager James M. Swank, of the American Iron & Steel Association, contributes the leading article in the January number of the *Pennsylvania Magazine of History and Biography*, under the title "The Manufacture of Iron and Steel Rails in Western Pennsylvania." As it gives in compact form an important chapter in the development of our splendid steel industry, we make liberal extracts below. In the introductory portion of the article, Mr. Swank refers to the part the tariff has played in the establishment of steel rail manufacture in the United States and the immense importance of the cheapened steel rail as a factor in the building up of our unparalleled transportation industry. He then goes on as follows:

In the manufacture of iron rails Western Pennsylvania was prominent in the early days of American railroads.

FIG. 5.—SOUTH END OF PLANT SHOWING AMPLE LIGHT IN THE MORNING.

At Brady's Bend, on the Allegheny river, in Armstrong county, the Great Western Iron Works, embracing four furnaces and a rolling mill, were commenced in 1840 by the Great Western Iron Co., composed of Philander Raymond and others. The rolling mill was built in 1841 to roll bar iron, but it afterwards rolled iron rails, which were at first only flat bars, with holes for spikes countersunk in the upper suface, and in 1846 and afterwards it

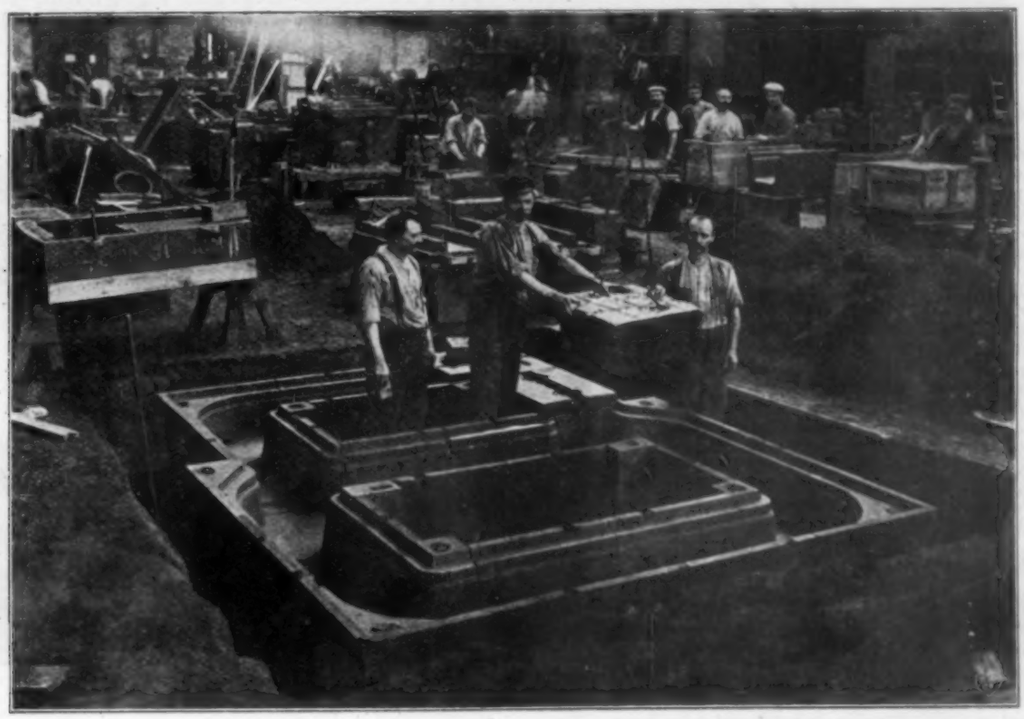


FIG. 6.—PIT MOLDING.

rolled T rails. In 1856 it made 7,533 tons of rails. It was one of the first mills in the country to roll T rails, our first rails of this pattern having been rolled in 1844 at the Mount Savage Rolling Mill, in Maryland. The Brady's Bend mill continued to make rails until after the close of the civil war. In October, 1873, it ceased operations. Shipments

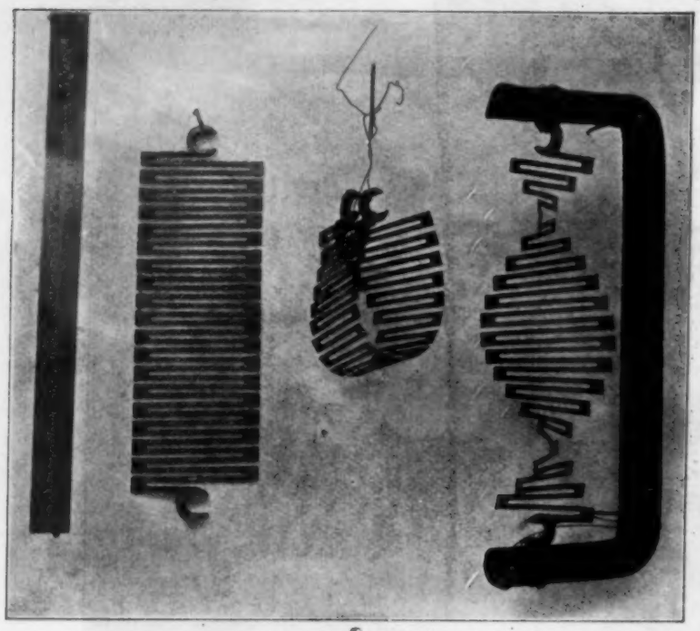


FIG. 7.—SOME TEST PIECES.

of rails were made by the Allegheny river. In 1849 the Great Western Iron Co. failed and the Brady's Bend Iron Co. took its place. The mill and the furnaces have long been abandoned and have gone to decay. In the *Railway Age*, of Chicago, for April 3, 1903, there appeared the following interesting reminiscence of the Brady's Bend enterprise, contributed by Mr. G. W. P. Atkinson.

The Allegheny Valley railroad in 1865 operated only 44 miles from Pittsburg to Kittanning. It is now part of the Pennsylvania system. At that time steamers ran up the Allegheny river from Pittsburg to Franklin when there was water enough. There was a rail mill at Brady's Bend in 1865, with which the writer was connected, and which during the war made a great deal of railroad iron. William B. Ogden, Chicago's first mayor, was president of it, and the writer had charge of its sales. If the river was not navigable for steamers we had to take the stage from the Kittanning end of the Allegheny Valley railroad to Brady's Bend, and a tough ride it was. The writer and William B. Ogden made the trip several times together. Rails were shipped by river in barges to Pittsburg or Cincinnati. In the fall of 1865 the writer shipped 2,000 tons of rails for the Nashville and Chattanooga railroad (which was run by the Government during the war) from the Brady's Bend mill in barges down the Allegheny and the Ohio rivers and up to the Cumberland river to Nashville. It took about six weeks to reach Nashville. As one passes East Brady Station today on the Allegheny Valley railroad the tall stack of the rolling mill is visible on the opposite side of the river, all that is left of the once busy town of Brady's Bend, with 3,000 people. [The stack was torn down in 1903.]

In 1853 the Cambria Iron Works were built at Johnstown, Cambria county, by the Cambria Iron Co., expressly to roll T rails, George S. King being the leading member of the company and the originator of the enterprise. Within a year the works were making rails. Several charcoal and coke furnaces were connected with these works. In 1856, under new management, they made 13,206 tons of rails, and their production was afterwards increased. For almost twenty-nine years, beginning with 1855, Daniel J. Morrell, who died in 1885, was the successful general manager of these works. In 1871, through his persistent advocacy of steel rails, their manufacture was added to that of iron rails, in which branch of the steel industry these works have ever since been prominent. John Fritz, the distinguished engineer, is entitled to the credit of having made the manufacture of iron rails at these works a conspicuous success, accomplished chiefly through his introduction of three-high rolls in 1857; while his brother, George Fritz, also distinguished as an engineer, successfully superintended the introduction at the same works of the Bessemer process and the manufacture of Bessemer steel rails. In 1898 the works were leased to the Cambria Steel Co., which now operates them.

In 1865 the Superior Iron Co. built the Superior Rolling Mill at Manchester, in Allegheny county, to make iron rails. Connected with this mill were two coke furnaces, built in 1863. The company operated the works until September, 1867, when they were leased by Springer Harbaugh. On Jan. 1, 1870, Harbaugh, Mathias & Owens took possession as owners, and on August 1, 1874, they failed, when the manufacture of rails was abandoned. The works themselves have long been abandoned. A few other iron-rail mills in Western Pennsylvania, including those which were equipped for the manufacture only of mine rails and other light rails, need not be mentioned. Of these mills those which made rails of heavy sections never at any time produced any considerable tonnage. It is a noteworthy fact that Allegheny county, with all its enterprise in the manufacture of iron and steel, did not begin to make rails of heavy sections until the Superior Rolling Mill was built in 1865. Iron rails are not now made in Western Pennsylvania, except occasionally a very few tons of light rails for lumber and mine roads.

The Bessemer process for the manufacture of steel, which has given us the steel rail, dates from 1855, in which year Henry Bessemer, of England, obtained his first patent for this process. Other patents followed in 1856, but the important invention was not perfected until 1857, in which year Robert Forester Mushet, also of England, added his essential spiegeleisen improvement. In 1856 Mr. Bessemer obtained patents in this country for his invention, but he was immediately confronted by a claim of priority of invention preferred by William Kelly, of Eddyville, Ky., but a native of Pittsburg, Pa., which claim was approved by the Commissioner of Patents. Experi-

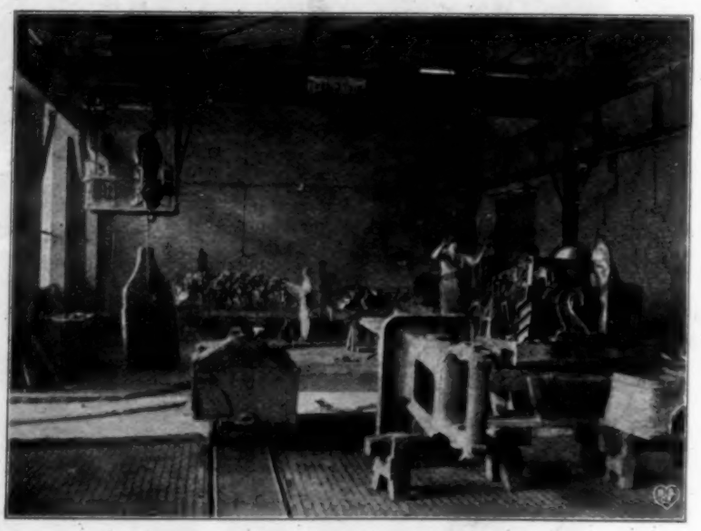


FIG. 8.—PICKLING DEPARTMENT.

ments were made with Mr. Kelly's process at the Cambria Iron Works in 1857 and 1858, and in September, 1864, steel was successfully made by this process at experimental works which were erected at Wyandotte, Mich., by the Kelly Pneumatic Process Co., of which Daniel J.

Morrell, of Johnstown, and William M. Lyon and James Park Jr., of Pittsburg, as well as Mr. Kelly, all Western Pennsylvanians, were members. Success, however, was attained only by the use of the Mushet improvement, the control of which for this country the company had secured. In February, 1865, the firm of Winslow, Griswold & Holley was successful at Troy, New York, in making steel by the Bessemer process with the Mushet improvement, the firm having obtained the control for this country of the Bessemer patents but not the right to use the Mushet improvement. In 1866 the ownership of all the above patents was consolidated, and soon afterwards the manufacture of Bessemer steel in this country in commercial quantities was commenced. At first and for many years afterwards only rails were made from Bessemer steel, and today nearly all the rails that are in use in this country were so made.

Steel rails have almost entirely supplanted iron rails on American railroads. Poor's Manual of the Railroads of the United States for 1901 contains a statement which shows the number of miles of steam railroad track, exclusive of elevated city passenger railway track, that were laid with iron and steel rails respectively in each year from 1880 to 1901. In 1880 there were 81,067 miles laid with iron rails and 33,680 miles, or 29.1 percent, laid with steel rails. In 1901 there were 19,181 miles laid with iron rails and 246,811 miles, or 92.7 percent, laid with steel rails. In both years side tracks and double tracks are included. The length of the steam railroads completed in the United States at the close of 1901, without regard to the number of their tracks, and excluding all elevated city passenger railways, was 198,787 miles.

Much of the progress of this country in the manufacture of Bessemer steel rails has been due to the enterprise displayed by Andrew Carnegie at the Edgar Thomson Steel Works, at Braddock, near Pittsburg, the site of Braddock's defeat in 1755, the construction of which works was undertaken in 1873 and completed in 1875 by a company of which Mr. Carnegie was the leading spirit and of which his brother, Thomas M. Carnegie, who died in 1886, was a member. Andrew Carnegie was the leading stockholder in the company. These works were built expressly to make Bessemer steel rails. The first Edgar Thomson steel rail was rolled on Sept. 1, 1875. At first only a Bessemer plant and a rolling mill were built, but in 1879 the erection of large blast furnaces was commenced. Until these furnaces were built the Edgar Thomson steel plant was largely supplied with pig iron from the two nearby Lucy furnaces, built respectively in 1872 and 1877, and owned in 1875 and subsequently by Carnegie Brothers & Co.

From year to year Mr. Carnegie steadily increased the capacity of the Edgar Thomson Works and thus cheapened the cost of producing rails. From the first he had unbounded faith in the future of the steel rail; he knew that its general substitution for the iron rail on American railroads was sure to come at an early day. He foresaw this evolution and fully prepared for it when experienced manufacturers and even many railroad officials continued to praise the iron rail. Hence, when others were timid or neglectful of their opportunities, he introduced at the Edgar Thomson Works from time to time the best and most economical methods of manufacture: the blast furnaces at these works were the best in the country, the Bessemer converters were the largest, and the rail mill was the swiftest; so that, when an extraordinary demand for steel rails would come, as it often did come, he was fully prepared to meet it and at a lower cost than that of his competitors. He had business foresight in an eminent degree; he had unfaltering courage; and more than all his cotemporaries he believed in tearing out and making a scrap heap of even modern machinery when better could be found. The best engineering talent in the country was engaged to bring the Edgar Thomson Works up to the highest possible state of efficiency.

FIG. 9.—SOUTH END OF PLANT SHOWING AMPLE LIGHT LATE IN THE AFTERNOON.

These characteristics were again illustrated when Mr. Carnegie and his partners in the firm of Carnegie, Phipps & Co. succeeded to the ownership of the Homestead Steel Works in 1883, and again in 1890 when Carnegie Brothers & Co., then operating the Edgar Thomson Works, succeeded to the ownership of the Duquesne Steel Works, with the result that steel in other forms than rails has been greatly cheapened to all consumers. This lowering of prices was accomplished through the use of the best mechanical appliances and the production of the largest possible tonnage. At the Edgar Thomson Works Mr. Carnegie set the pace for a large annual tonnage of steel rails, and this policy was afterwards applied to the production

of pig iron and other products. His American competitors were soon compelled to abandon their conservative ideas and to enlarge the capacity and increase the efficiency of their works. And he has compelled Europe to revise in a large measure its metallurgical practice and also to cheapen its prices for all steel products. It has freely copied the devices and processes which his engineers, with his encouragement, had introduced or perfected. Of the engineers referred to, Mr. Carnegie's first superintendent at the Edgar Thomson Steel Works, Captain William R. Jones, whose tragic death occurred in 1889, is entitled to special mention. To these engineers and to his "young partners" Mr. Carnegie has always acknowledged that he was under great obligations.

Mr. Carnegie's distinguished and remarkable career as an iron and steel manufacturer, which conspicuously began on the threshold of the fourth quarter of the nineteenth century, when the Edgar Thomson Works were first put in operation, although he had previously been identified with our iron industry, may be said to have ended immediately after the close of the century, in February, 1901, when he transferred the ownership of all the iron and steel properties and auxiliary enterprises in which he had a controlling proprietary interest to the United States Steel Corporation. Soon afterwards, in 1902, he was chosen president of the Iron and Steel Institute, whose membership is not restricted by political or geographical lines, but which has its home in Great Britain, and he presided over its deliberations at the spring and autumn sessions of 1903, at London and Barrow respectively, on each occasion delivering an address. Mr. Carnegie was the first American to receive this honor. No higher honor can be conferred upon any iron and steel manufacturer, wherever his home may be, than to be electetd to the presidency of the Iron and Steel Institute.

The great success of the Edgar Thomson Steel Works and of other Bessemer steel plants in the United States led to the erection in Allegheny county of two competing steel works, noticed above; the Homestead Steel Works, which were completed and put in operation in 1881, and the Duquesne Steel Works, which were undertaken in 1886 and put in operation in 1889. Both these works were built to make Bessemer steel, but, while the Homestead Works were erected to make miscellaneous steel products, including rails, the Duquesne Works were built to make rails only. The Homestead Works rolled their first steel rail on August 9, 1881, and the Duquesne Works rolled their first steel rail in March, 1889. Down to their absorption by Carnegie, Phipps & Co. in 1883 the Homestead Works rolled in all about 125,000 tons of rails, and down to their absorption by Carnegie Brothers & Co. in 1890 the Duquesne Works rolled in all about the same number of tons, all, or nearly all, of the rails rolled by both works being of heavy sections. Since the changes in ownership above noted these works have not made many rails. The Homestead Works have not made any rails since 1894 and the Duquesne Works have not made any since 1892. The Homestead Works were built by the Pittsburg Bessemer Steel Co. and the Duquesne Works by the Allegheny Bessemer Steel Co.

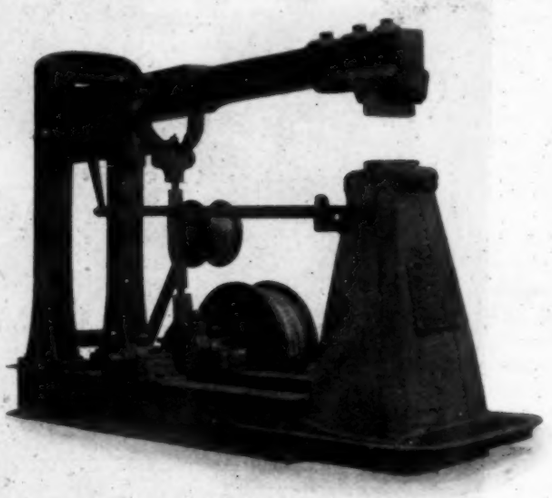
The prominence of Western Pennsylvania in the manufacture of steel rails today is best shown by a reference to the statistical record. In 1902 the whole country made 2,935,392 tons of Bessemer steel rails, and of this large production Western Pennsylvania made 950,266 tons, or nearly one-third of the country's total production. This large tonnage was almost entirely rolled at the two works above mentioned, the Edgar Thomson and the Cambria Works, operated respectively by the Carnegie Steel Co. and the Cambria Steel Co., less than three thousand tons having been rolled by the Jones & Laughlin Steel Co., which has never made the manufacture of rails a leading specialty.

The first 30-foot rails ever rolled in this country are claimed to have been rolled at the Cambria Iron Works in 1855. These rails were perfectly made, but there being no demand for them they were used in the company's tracks. In 1876 these works rolled the largest aggregate tonnage of rails that had been rolled in one year by one mill in this country up to that time. Their production of rails in that year was 103,743 net tons, of which 47,643 tons were iron rails and 56,100 tons were steel rails.

The first 60-foot rails ever rolled in this country were rolled at the Edgar Thomson Steel Works in the fall of 1875 and were made of steel. At the Centennial Exhibition at Philadelphia in 1876 the Edgar Thomson Steel Co. exhibited a steel rail which at that time was the longest steel rail that had ever been rolled. It was 120 feet long and weighed 62 pounds to the yard.

THIRTY-POUND HELVE HAMMER.

This 30-pound helve hammer, exclusive of the helve and bolts which make it equal to a 40-pound hammer, is made by the Hathorn Foundry & Machine Co. of Mason City, Iowa. The hammer is intended for working four-inch stock and smaller. The 350-pound anvil, as will be seen from the illustration, gets a generous share of the total weight. The bed is formed of two six-inch steel I-beams clamped to the anvil with a steel plate and an intervening one inch board. The arrangement provides for the weight of the anvil coming directly on the foundations and not on the I-beams. The slot in the helve is lined with brass boxes and the stroke, from 12 to 14 inches according to the speed of the hammer, is capable of adjustment with the rod at left of anvil while the machine is in



A NEW HELVE HAMMER.

operation. The speed and strength of blow are governed by the foot lever and an idler pulley is employed for tightening the four-inch driving belt. The upright frame is of cast iron and the machine complete weighs 1,000 pounds.

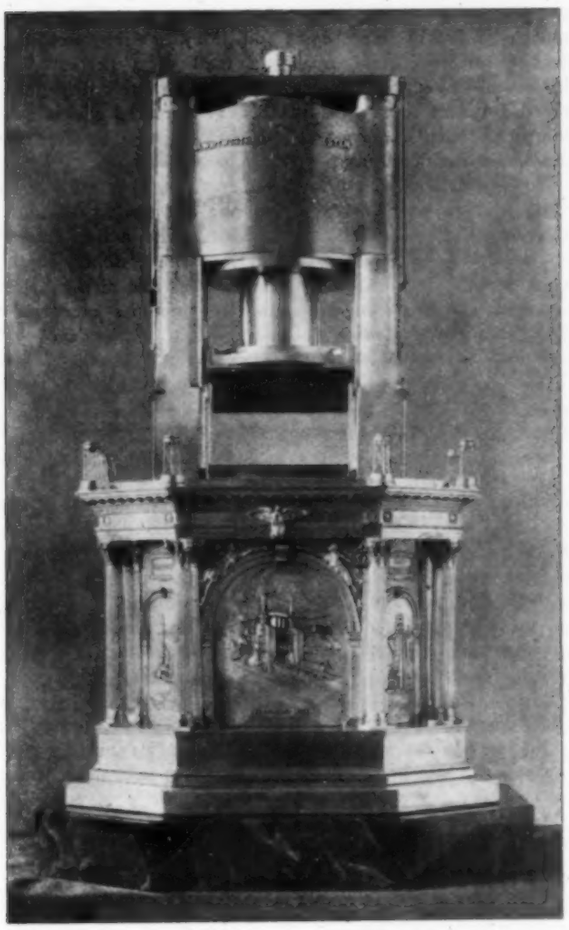
"Fowler's Electrical Engineer's Year Book for 1904" is a 4 x 6-inch handbook of 550 pages. The annual publication of the work affords an opportunity for revision and additions, the latter including the general rules for wiring of the Institute of Electrical Engineers, the Board of Trade regulations and rules relating to street railway and electric lighting practice. These data are of foreign service, as the book is an English production, but considerable material refers to general electrical engineering. An interesting directory is given of electric light, power and traction stations in Great Britain. This submits briefly the particulars of the station plant, equipment and staff of over 500 installations and is useful for comparison. The book is published by the Scientific Publishing Co., of New Bailey street, Manchester, Eng. It is bound in leatherette and is sold in England for 1s 6d.

In a note to *The Iron Trade Review*, the Cleveland Car Co., West Park, Cleveland, O., refers to the generous business that has come from its trade in the past year and says that it is now in much better shape than heretofore to handle orders in light steel cars and industrial railway equipment. A new catalogue has just been issued illustrating practically the entire line of its manufactures.

TESTIMONIAL TO PRESIDENT COREY.

Two presentations marked the annual banquet of the Carnegie Steel Co. held at the Duquesne Club, Pittsburg, on Saturday evening, Jan. 9. A miniature reproduction in silver of a forging press at the Homestead Steel Works was presented to William Ellis Corey, formerly president of the Carnegie Steel Co., now president of the United States Steel Corporation. To George E. McCague, who retired as traffic manager of the Carnegie Steel Co. on Jan. 1, after thirteen years' service was presented a beautiful picture representing an Arabian scene. The banquet was attended by 55 persons. Regrets were received from Andrew Carnegie, C. M. Schwab, H. C. Lynch and J. O. Hoffman. H. P. Bope, first vice president of the Carnegie Steel Co., on behalf of his associates, presented the salver testimonial to Mr. Corey, while Judge J. H. Reed made the presentation to Mr. McCague.

The Corey testimonial contains 535 ounces of sterling silver, the press and support of silver standing 24½ inches in height,



TESTIMONIAL TO W. E. COREY.

resting on a Brazilian onyx base. Eight beautiful Corinthian columns, supporting a richly sculptured entablature, form a part of the base. These columns admit of eight arched panels in which are vignettes, all in relief, of notable subjects closely associated with the steel industry. One panel has the battleship Kearsarge; the middle panel, a blooming mill; the third the Flatiron building, New York; the fourth, a steel converter; fifth, a blast furnace stack; sixth or middle panel, Homestead steel works; seventh, bridge in Pittsburg, and on the eighth is inscribed: "A tribute of love to William Ellis Corey from his associates in the operating department of the Carnegie Steel Co." In this way are brought together the manifold details of the steel business, with every part intimately connected with the forging press. Those present at the gathering were: H. P. Bope, W. W. Blackburn, J. H. Blackburn, L. T. Brown, W. A. Bostwick, L. C. Bihler, W. R. Balsinger, R. B. Bainbridge, C. W. Baker, W. E. Corey, James J. Campbell, D. M. Clemson, M. E. Combs, W. R. Conrad, Thos. F. Cole, A. C. Dinkey, C. E. Dinkey, H. J. Davis, W. B. Dickson, H. A. Fennerty, James Gayley, A. R. Hunt, G. K. Hamfeldt, E. J. Hamilton, H. P. Howell, I. W. Jenks, D. G. Kerr, J. P. Kessler Jr., H. J. Lindsay, John T. Lewis, George Lauder, W. C. McCausland, Thomas McDonald, John McLeod, C. E. McKillips, F. R. McFeatters, Nevin McConnell, George E. McCague, J. C. Neale, N. M. Petersen, G. D. Packer, J. H. Reed, John Reis, W. J. Root, W. H. Singer, James Scott, E. E. Slick, James G. Shiras, J. H. Slocum, B. H. Taylor, C. L. Taylor, E. H. Utley, H. D. Williams, William Whigham, John E. Woods and Thomas Woods.

EASTERN PENNSYLVANIA.

HARRISBURG, Pa., Jan. 12.—There is a better feeling among the iron and steel manufacturers in this part of the Keystone State and furnace companies are hurrying forward improvements so as to be able to start when business justifies it. One or two concerns do not share in the feeling that better times are coming and have made no plans for early starting.

The Pennsylvania Steel Co. has made some extensive alterations in its rail and blooming mills and will start them soon. The company has started two more blast furnaces in Steelton and one in this city. It is pushing its new coke plant at Lebanon where it has repaired its largest furnace.

The Robesonia Iron Co. will start its furnace this month after overhauling.

Part of the office force of the Lorain Steel Co. has been removed to Johnstown, where the company has iron and steel foundries and switch and drop forging plants.

The Howe works at Danville, idle for some time, have been started up and will be run on full time.

The National Tube Co. will soon resume operations at its Middletown works and a wage readjustment will be made.

At Reading the conditions are said to be improving and there is a probability that February will find more furnaces in blast. The Reading, Brooke and Empire companies have arranged for starting furnaces when conditions are better. The Reading Iron Co. has started several of its mills.

In the Lehigh Valley some stacks are running, wage reductions having been accepted. None of the companies, according to reports, will make any extended increase in operations for some weeks yet.

The Sternbergh plant of the American Iron & Steel Mfg. Co. at Reading has started work again and will be kept going. The company's plant at Reading is also doing considerable work.

The Lebanon Valley Iron Co. has declared a semi-annual dividend of 3½ percent.

There has been a reduction of operations at Chester. Some of the largest plants are making short hours.

Among the companies chartered last week were the Williams Drop Forge Co., of Scranton, capital $50,000, and the Union Forge Co., of Philadelphia, capital $5,000.

The January number of the *World's Fair Bulletin*, the illustrated magazine published by the World's Fair Publishing Co. in the interest of the St. Louis Exposition, devotes three pages to the Mines and Metallurgy Palace. A sketch is given of Joseph A. Holmes, chief of the department of mines and metallurgy. He is a native of South Carolina and a graduate of Cornell university. For 10 years he was professor of geology and mineralogy in the University of North Carolina and State Geologist of North Carolina. Since 1891 he has been connected with State and Government surveys and in this work has examined mineral deposits in a large number of States and Territories. He had part in the installation of mining exhibits at the Atlanta, New Orleans and Chicago expositions, and served as a juror at Omaha, Buffalo, Atlanta, Nashville and Charleston expositions. He is a member of the American Institute of Mining Engineers, American Geological Society, American Association for the Advancement of Science and Washington Academy of Science.

A dry compound for case hardening has recently been invented by Joseph Cadotte of Suncock, N. H. The mixture consists of 40 percent of white calcined plaster, 40 percent of prussiate of potash and 20 percent of lampblack.

BLAST FURNACE OPERATIONS.

The blast furnace and four batteries of coke ovens of the Lackawanna Steel Co. at Cornwall and Colebrook, Pa., will be put in operation next spring. The Pennsylvania Steel Co., Steelton, Pa., has put in blast its No. 4 furnace. The company's Lochiel furnace will also be put in blast this week. It has been out for several months during which repairs have been made. The Belmont furnace of the Wheeling Steel & Iron Co., Wheeling, W. Va., was banked Dec. 10. The Toledo furnace, Toledo, O., was blown in Dec. 29. The Chatham furnace, Chatham, N. Y., was blown in last week. The Woodstock furnace of the Woodstock Iron Co., Anniston, Ala., was blown out Dec. 8. The West End furnace, Roanoke, Va., has been blown out for an indefinite period. The Graham Iron Co. blew in its furnace at Graham, Va., Dec. 26. The Rockhill furnace, Huntington Co., Pa., was blown in Dec. 30. The Mabel furnace, Sharpsville, Pa., has been blown out for a short time. The Etna furnace of the Marting Iron & Steel Co., Ironton, O., was blown in Jan. 7. The Union furnace of the Union Iron & Steel Co., Ironton, O., has been blown out to make repairs. The Anna furnace at Struthers, O., was blown out Dec. 12. A new lining is being put in. Only one of the Sheffield furnaces, Sheffield, Ala., is now in blast. The Virginia Iron, Coal & Coke Co. has banked its two furnaces at Middlesborough, Ky. The plant will be out of operation for 90 days. About 200 men are thrown out of employment. Furnace No. 6 of the Illinois Steel Co. at South Chicago was blown in Jan. 8.

Seven of the eight idle stacks of the Edgar Thomson plant of the Carnegie Steel Co., Braddock, Pa., will be in operation before the end of the week. Three of the furnaces were blown in last Saturday and two were blown in this week. Two additional stacks will be started on Thursday or Friday. Since the rail mill has been idle only one furnace at this plant has been on Bessemer iron, while two have been operating on ferro-manganese and spiegel respectivly. Furnace C of this plant will continue out for some time as it is to be practically rebuilt. Stack No. 2 of the Ohio plant of the Carnegie Steel Co., Youngstown, O., was blown in last week after being out for repairs for the past three months. The stack has been relined and a number of improvements have been made. Furnace No. 3 is being rebuilt, while stack No. 4 will not be completed and ready for operation until April.

The Illinois Steel Co. will put in blast again two furnaces at Joliet and an additional stack at South Chicago.

Removing from New York to Pittsburg.

Officers and clerks of the general order and purchasing departments of the American Sheet & Tinplate Co. arrived in Pittsburg last week on a special train. This was the vanguard of the forces of the American Sheet Steel and American Tin Plate companies, now merged, which will hereafter be located in Pittsburg instead of New York. Others will follow in the next two weeks. The auditing and sales departments, together with the executive officials, will be in Pittsburg before Feb. 1. While the offices of the company will be located on the thirteenth floor of the Frick building, the purchasing department will be located in the Vandergrift building until April 1, when all the departments in this building will be removed to the Frick building. The retirement of Eugene W. Pargney as manager of the sheet plants in the Kiskiminetas Valley, to become second vice president in charge of sales, has necessitated the appointment of a new superintendent in charge of these plants. S. A. Davis, formerly superintendent of the Vandergrift sheet mill, has been placed in charge of all the plants in the Kiskiminetas Valley, and in addition has been appointed superintendent of the two tin plate mills at New Kensington, Pa., this being quite a departure.

A meeting of citizens of Napoleon, O., was held Jan. 7 to devise means to assist the Morning Star Threshing Machine Co., whose plant was recently destroyed by fire, to resume business. It was decided to collect subscriptions to an amount that will cover the cost of erecting a fireproof building to replace the burned structure.

AMERICAN CAR & FOUNDRY CO.'S DIVIDEND REDUCED.

Directors of the American Car & Foundry Co. at their meeting in New York last week, adopted resolutions to cut the dividend on the common stock from a 5 percent to a 2 percent basis. The financial statement showing the operations of the company reveals a decrease in net earnings for the quarter ended Nov. 30, of $590,760 and for seven months ending with the same period of $834,539. Following is the statement of net earnings for the periods named:

	Three months ending Nov. 30.	Seven months ending Nov. 30.
1903	$1,561,485	$3,640,323
1902	2,152,285	4,474,862
1901	938,811	2,025,476

The directors declared a dividend of 1 percent on the common stock for the six months. The first installment of ½ percent is payable Feb. 1 and the second of a like amount May 1. Four dividends of 1 percent were declared on this stock during the last calendar year. As the company's fiscal year begins on May 1 the common dividend declared really make a total of 3 percent for the business year. Two quarterly dividends on the preferred stock at the regular rate were declared. This action, it was explained, was taken for the purpose of completing the dividend payments for the current fiscal year.

W. H. Woodin, who is a director of the company, said: "The meeting was a harmonious one and the resolutions regarding dividends were unanimous. The action taken by the directors as to the dividend on the common stock is explained by the falling off in earnings and also by the conservative policy of the company since its inception. The directors decided to declare the two dividends of ½ percent to complete the dividend payments for the fiscal year of the company which ends April 30. Business prospects for the future look very much better than they have been for the past few months. The railroads are ordering equipment more freely than recently."

Benner's Iron Market Prophecies.

The 14th edition of "Benner's Prophecies" with forecast for 1904 on pig iron, hogs, corn and provisions, has appeared, published by the Robt. Clarke Co., of Cincinnati. Four years ago the author, Samuel Benner, an Ohio farmer, wrote what was regarded as his farewell as a prophet of industrial and business development. "The spirit of prophecy has nearly departed," he said, and a successor was called for who should "bring the tables of prices up to date and extend the cycles into the far future." In his forecast for 1900 Benner prophesied a down cycle in prices and in general trade to continue five years after 1899. His specific prophecy that prices for pig iron would incline downward in 1900 was realized, but the ascent was resumed without his consent in 1901 and kept on in 1902, without culminating until 1903. One feature of the prophecy of 1900 is now being realized, namely: "Notwithstanding their power to raise and hold up prices in good times for their individual benefit, trusts cannot hold up prices in bad times; the down cycle will override them, as these cycles have done in all things in past depressions."

For the year 1904 Benner predicts lower prices for pig iron, railroad stocks and many commodities than in 1903, and after 1904 a revival in trade, better times and higher prices until 1911. "The decline in iron and steel, curtailment of orders for railroad materials and manufactured commodities will continue through the year 1904. The year 1905 will be the beginning year of a new up cycle in pig iron and for long continued prosperity in general business, lasting until the next commercial revulsion which will be due in 1911."

Butterfield & Co., Derby Line, Vt., manufacturers of stocks and dies, solid die plates and Reece's screw plates, report that their business has not yet commenced to show any falling off. "Some weeks ago," they add, "we were inclined to think that the continuation of business was largely the result of the momentum gained from the immense business pressure of 1902. We are now beginning to think, however, that trade is to continue good through the coming season."

TRADE PUBLICATIONS.

"Industrial Railways" from the Hoshor-Platt Co., of New York, has 93 9 x 10½-inch pages. There are numerous illustrations; halftones of equipment of various kinds, layouts of railways for the very varied service ranging from boiler plants to postoffices. A chapter on tractive force is of a practical character and worth study before a railway is installed in shop or foundry.

A list of crank sizes is the main feature of a small pamphlet from Wyman & Gordon, of Worcester, Mass., and Cleveland. The brief introduction suggests the increasing size of drop forging operations as mention is made of the fact that the firm is now making die forgings weighing over 150 pounds each. A card of new year greeting accompanies other matter and intimates that the series of short stories of eminent American and European inventors and engineers will be continued monthly and that later these will be collected in book form. The biographies are sent gratuitously to those interested.

The latest catalogues of the "New Era" and "Little Giant" gas and gasoline engines are accompanied with a letter calling attention to the change in the name of the builder. The firm name has been changed from New Era Iron Works to the New Era Gas Engine Co., of Dayton, O. The engines are built single and double cylinder, horizontal and vertical, in a large assortment of sizes.

Catalogue B from the Carnahan Stamping & Enameling Co., of Canton, O., deals with a line of staples in gray ware together with a number of items new to the trade and peculiar to the manufacturers. The company has steel works, rolling mills, tin mills, stamping and enameling departments. The bar plant has a capacity of about 300 tons daily, an item which indicates the plant capacity as a whole.

An introduction to the general line of machinery made by the C. W. Hunt Co., of West New Brighton, N. Y., is at hand. The illustrations are necessarily small but distinct and will serve admirably in summarizing the contents of the larger publications detailing conveying machinery.

Some of the labor saving tools which appear in the catalogue from the pneumatic tool department of the Ingersoll-Sergeant Drill Co., of New York, have been illustrated in *The Iron Trade Review*. There are, however, a number of features combining novelty and usefulness. The riveting hammer has a locking trigger which catches the throttle lever automatically when the valve is closed, and thus serves as a safety device, preventing the rivet set being thrown from the cylinder, as the valve cannot be accidentally opened. Another appliance is a frame for the No. 3 Haeseler piston drill. This is capable of adjustment in any direction and is useful in heavy machinery and structural construction.

Catalogue 18 supplements the general catalogue of the Northern Engineering Works, of Detroit, Michigan. Illustrations are presented of cranes specially designed for large industrial plants and power stations. Cranes for foundries, machine shops, etc., are more fully illustrated in the general catalogue.

"Suggestions for Those Who Use Incandescent Lamps" comes from the Sawyer-Man Electrical Co. of New York. Brief chapters treat of lamp selection, economy of renewal value of voltage regulation and kindred matters.

"Water Meters" is the title of a pamplet received from the Henry R. Worthington Co., of New York, whose new disc meter is described with cuts showing the internal construction. The pamphlet also describes the standard duplex piston meter and the Worthington hot-water meter. The latter device has been found of value in boiler plants for checking up the evaporative values of different kinds of coal, the efficiency of firemen, etc.

The latest catalogue of M. H. Treadwell & Co., 95-97 Liberty street, New York, whose works are at Lebanon, Pa., is an unusual publication in the excellence of its illustrations, typograph, paper and cover. It is devoted to the special machinery manufactured by this company, covering a wide range, from the Edison drier at the plant of the New Jersey Zinc Co., Franklin Furnace, N. J., which appears as a frontispiece, to the sugar machinery, open-hearth furnace work, coke handling machinery and slag and cinder cars illustrated on other pages. A significant engraving in the middle of the book entitled "The First Blow," shows a number of workmen giving the blast to the original cupola, the group containing several of the present officers of the company. This original cupola has been replaced by a larger one and there are now turned out 40 to 50 tons of finished castings a day. An important part of the present outfit of the company is cinder and hot metal cars, scale cars and various other cars for the transportation of material in and around steel plants, rolling mills, mines and furnaces.

Some attractive leaflets have been brought out by the Mosher Water Tube Boiler Co., No. 1 Broadway, New York, containing illustrations and description of this type of boiler; also tests of the Mosher boilers by the United States Government on the monitor Florida. Cuts of torpedo boats and fast yachts fitted with these boilers are also shown, including the steam yacht Arrow, speed 45 miles an hour, and the Ellide, speed 40 miles an hour.

COMPOUND METALS.

The successful welding of different metals, whose welding points lie more or less apart, is a problem which has long baffled the efforts of metallurgists, for, except in the case of precious metals, all attempts in that direction have, until recently, proved futile. This has been particularly the case when it has been tried to give iron or steel the appearance and qualities of superior metals, such as copper, bronze, or aluminium. Metals whose welding points lie fairly close together have been made to unite by heat and pressure, as, for instance, iron and copper; but the result was of no practical value, because of the brittle alloy which was formed at the junction of the two metals, and which caused them to separate during subsequent rolling processes. This serious defect appears now to have been overcome by the invention of Mr. Heinrich Wachwitz, a metallurgical engineer of Nuremberg, who has succeeded in joining the most dissimilar metals by means of the application of aluminium between them, and without in any way impairing their natural ductility.

Among the most important combinations produced in a commercial sense are, perhaps, the following: Copper-plated steel, aluminium bronze-plated steel, aluminium-plated steel, steel-plated aluminum, copper-plated aluminum, and silver-plated aluminium. Other useful combinations can, however, be produced, including triple combinations for special purposes. Copper can also be united to zinc, and lead to iron. The following are a few of the uses to which sheets made from compound metals have, or can be, put, on account of their moderate price as compared with sheets made entirely from the more expensive metal used in any combination. Copper or bronze-plated steel for light yet indestructible roofing, in either flat or corrugated sheets, tanks, cylinder tubes, cooking utensils, etc. Aluminium-plated steel for the safe and wholesome canning of food for any length of time. Copper-plated aluminium for superior cooking utensils, and many special purposes where it is important to have a safe soldering surface, as well as the extra lightness over pure copper. Steel-plated aluminium for ship, yacht, and boat building, where rigidity is required combined with lightness. Silver-plated aluminium for table utensils, lamps, etc., the rolled-silver plating being much harder than electro-silver plating. We understand that the manufacturers contemplate making both copper-plated and bronze-plated iron wire, the uses for which will, no doubt, be numerous. We have examined many specimens of these compound metal sheets, as well as articles made from them, and have been much struck with the perfect union there appears to be between the different metals composing the compound sheet, and with the amount of punishment the material will stand without the slightest tendency for one metal to part from the other. The invention has already been worked successfully on a large scale for about two years by a German company, while two companies in France are also carrying on the manufacture of these compound metals. The Compound Metals Co., Ltd., whose London office is at 162 to 165 Birkbeck Bank Chambers, W. C., have taken up the invention and have erected large works at Greenock for the purpose of manufacturing sheets rolled from these compound metals.—[Engineering.

GAS, COKE, TAR AND AMMONIA PRODUCTS IN 1902.

A new feature in the volume for 1902 of the Mineral Resources of the United States published by the United States Geological Survey is an article by Mr. Edward W. Parker on the production of gas, coke, tar, and ammonia at gas works and in retort coke ovens.

In making its annual canvass of the coal-mining and coke-making industries for 1902, the Survey has extended its inquiries in order to cover all plants producing gas and coke from coal and covering tar and ammonia. A somewhat similar canvass was made in 1898 by Dr. William B. Phillips. At that time returns were received from 433 companies manufacturing gas from coal. The statistics for 1902 include reports from 533 companies, including those operating retort-oven coking plants.

In 1898 the 433 companies from which returns were received reported a total of 2,042,698 short tons of bituminous coal carbonized, producing 19,469,464,957 cubic feet of gas. Of this amount 18,431,201,414 cubic feet were sold for illuminating and heating purposes, leaving 1,038,263,543 cubic feet unaccounted for. The gas "unaccounted for" is probably lost through leakage, fire, or other accident. These figures for 1898 do not include the production from 520 by-product coke ovens, in which 402,297 tons of coal were carbonized and which yielded 294,445 short tons of coke.

In 1902 the returns from 533 companies, including the operations of 1,663 by-product coke ovens, show that 5,015,511 tons of coal were carbonized, which yielded 30,764,625,332 cubic feet of gas. Of this product 29,079,073,555 cubic feet were sold, leaving 1,685,551,777 cubic feet lost or unaccounted for. About 2,000,000 tons of the total coal carbonized were used in by-product ovens.

In 1898 the production of ammonia, reduced to its equivalent in sulphate, amounted to 31,102,796 pounds, of tar to 28,407,798 gallons. In 1902 these amounts had grown to 67,248,686 pounds and 53,171,733 gallons.

The total production of coke in 1898 from gas works and retort-oven plants was 1,510,724 short tons, of which 294,445 short tons were produced in by-product coke ovens. In 1902 the total output of coke from these plants was 3,377,763 short tons, of which 1,403,588 short tons were produced in by-product coke ovens, leaving 1,974,175 tons as the output from gas works in 1902, against 1,216,279 tons in 1898.

The aggregate value of all products obtained from the distillation of coal in gas works or retort ovens in 1902 was $43,869,440. About two-thirds of this amount, or $29,342,881, was represented by the value of the gas produced. The value of the coke produced was $11,267,608, while the tar was worth, at the works, $1,873,966. Most of the ammonia produced was sold in the form of ammoniacal liquor. The total quantity sold was 49,490,609 gallons and was worth at the works, $1,065,300. In addition to this there was an actual production of 11,276,502 pounds of sulphate, which sold for $319,685.

Comparatively little progress in the manufacture of chemical products from coal tar has been made in this country. Although we are producing over 50,000,000 gallons of coal tar annually, the principal uses made of it are for the manufacture of roofing paper, the creosoting of lumber, and for the preparation of street-paving material. At the same time we are importing millions of dollars' worth of chemicals obtained from coal-tar as a raw material. The coal-tar produced in this country in 1902 was worth at first hand $1,873,966. In the fiscal year ended June 30, 1902, the coal-tar products imported into the United States were worth, at points of shipment, $7,494,340. Including duty, freight, and other costs, their total value in the wholesale markets of this country probably amounted to about $12,000,000.

A receiver has been appointed for the Rockaway Iron & Steel Co., Rockaway, N. J. The plant was built in 1900-01 and first put in operation in May, 1901. The product is merchant bars. Annual capacity, 10,000 tons. Philander B. Pierson is receiver.

Litigation between stockholders of the Dayton Globe Iron Works Co., Dayton, O., has been adjusted and the suit dismissed.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The Everson Continuous Machine Co., Detroit, Mich., has been incorporated with a capital of $250,000.

The Northington Automobile Co., of New York City, has been incorporated with a capital of $200,000. Directors are: C. C. Northington, of Shawnee, Pa.; W. J. P. Moore, of New Britain, Conn., and H. R. Lounsbury Jr., of New York City.

The Kokomo Bit & Tool Co., Kokomo, Ind., has been incorporated with a capital of $10,000. The incorporators are: H. C. Davis, Geo. Castello, Henry C. Davis Jr.

The Central Car & Foundry Co., Vincennes, Ind., has been incorporated with a capital of $25,000. The incorporators are: Joseph R. Cavanaugh, H. E. Frazier and Chas. G. Mueller.

The Columbus Foundry & Machine Co., Columbus, O., has been incorporated with a capital of $100,00. The incorporators are: J. F. Angell, Grant Cusac, J. Embleton, Eli Rowles and others.

The International Manufacturing Co., Columbus, O., has been incorporated with a capital of $3,750,000. The Hallwood Cash Register Co. will be taken over by the new corporation and its plant enlarged.

The Onondaga Forge Co., Syracuse, N. Y., has been incorporated with a capital of $5,000 to conduct a general blacksmithing business. The directors are: George W. Dunkhorst, Eugene Hartman, Fred J. Dunkhorst and Sarah A. Dunkhorst.

The Eastman Cutlery Co., of New York, has been incorporated with a capital of $25,000. Incorporators are: David Eastman, R. Schweitzer and Sam T. Bundhus.

The Syracuse Safe Co., recently incorporated at Syracuse, N. Y., with a capital of $21,000, has leased the Phœnix foundry, corner East Water and Orange streets, and will occupy the building immediately. The incorporators of the company are Louis Aaron, Syracuse, William H. Holmes, Rochester, and J. Powers Kidd, of Philadelphia. The floor space of the Phœnix foundry is 110 x 120. The company is in the market for new machinery.

The E. J. Moore Machine & Foundry Co., Philadelphia, Pa., has been incorporated with a capital of $100,000.

The Jamesville Mfg. Co., Jamesville, N. Y., has been incorporated with a capital of $20,000 to manufacture bicycles. The incorporators are Albert Spencer, Jas. H. Olcott, Jamesville, N. Y., and Herbert Hotaling, Syracuse, N. Y.

The Walter H. Foster Co., New York, has been incorporated with a capital of $75,000 to deal in machine tools. The incorporators are W. H. Foster, F. H. Robinson, W. E. Flanders, all of New York.

The American Saw Mill Machinery Co., principal office Hackettstown, N. J., has been incorporated with a capital of $2,000 to manufacture machinery, railroad equipment, etc. The incorporators are Thomas Prusser, Hackettstown, N. H., Robert H. Richards, Maywood, N. J., and Edward A. Simmons, Hackettstown.

The Portable Electric Safety Light Co., Jersey City, N. J., has been incorporated with a capital of $250,000 to manufacture electrical machinery. The incorporators are D. T. McLaren, Jersey City, Henry H. Graff, Joseph Du Vivier, New York City.

The Smith Iron Foundry, Lynn, Mass., has been incorporated with a capital of $12,000. The officers are Albert F. Smith, president and clerk; Alonzo H. Smith, treasurer.

The Florence Co., Portland, Me., has been incorporated with a capital of $50,000 to manufacture and deal in heating apparatus. The incorporators are A. J. Desmond, Portland, president; H. L. Cram, Portland, treasurer; and Frederick Hale, Portland, clerk.

The Roeper-Kincaid Mfg. Co., Reading, Pa., is a new concern about to be organized under the laws of Pennsylvania, with a full paid capital of $30,000 of $100 per share. The president of the new company will be H. P. Roeper, of the Reading Crane & Hoist Works, and the general manager will be Jos. W. Kincaid, formerly with the Reading

Iron Co. The main work will be foundry business, but specialties will be developed as the opportunity presents itself.

The Pittsburg Machinery & Gas Engine Co., Pittsburg, Pa., has been incorporated with a capital of $10,000. The directors are J. P. Koehler Sr., L. C. Koehler, Shaler township, Allegheny county, and M. M. Tygard, Pittsburg.

The Gunther-Wright Machine Co., of Owensboro, Ky., is in the market for a cupola, 34 or 36-inch. Would buy a second-hand one if but little used.

The stockholders of the Ohio Gas Engine Works, Philadelphia, have decided to increase the capital of the corporation from $600,000 to $2,500,000 and build a large, new plant as soon as the management can find a suitable site. Large gas engines, producer gas plants, launches and marine engine, gasoline hoists, compressors and other adaptations of the gas engine will be manufactured. A suitable site must contain not less than 30 acres, must be located on a good water front and must have good railroad facilities.

J. Newt. Crabb, formerly of Richmond, Ind., now of Indianapolis, has invented a continuous rail made in three sections and has organized a company to manufacture the rail. J. F. Messick is president, Mr. Crabb vice president and general manager, and W. A. Zumpfe secretary and treasurer. The company is incorporated under the laws of Maine with a capital stock of $2,000,000.

The Steel Treatment Co., Chicago, has been organized with a capital of $2,500 to manufacture metal goods.

The Hoquiam Iron Works, Hoquiam, Wash., will add considerable new machinery to its machine shop. A large steam hammer will be installed in the black-smithing department and a number of traveling cranes are to be installed in different departments.

The White Elevated Car Co., Indianapolis, Ind., has been incorporated with a capital of $50,000.

The Kramer Bros. Foundry Co., Dayton, O., has been incorporated with a capital of $100,000.

The Vaughn Foundry Co., Norwich, Conn., has been incorporated with a capital of $20,000.

E. E. Crook, Dillwyn, Va., is in market for one complete hoisting engine and cable, 20 to 40 h. p.

Virginia Bridge & Iron Co., Roanoke, Va., is in market for 25-h. p. double-cylinder, double-friction-drum hoisting engine, with four winchheads, complete, ready for operation; second-hand preferred.

W. H. Gibbes & Co., Columbia, S. C., are in the market for an engine pulley 108 x 18 x 7 inches, to weigh 5,000 pounds.

T. E. True, C. Q. M., department of Texas, San Antonio, Tex., will receive proposals until Jan. 28 for construction and erection of a 300,000-gallon steel water tank and trestle at Fort Sam Houston.

A. V. Kaiser & Co., 222 South Third street, Philadelphia, will buy a horizontal flange punch of sufficient capacity to punch a 1⅛-inch hole through 1-inch iron or steel plates; would prefer second-hand.

Fires and Accidents:—

Fire started in the office of J. W. Authoine's machine shops, Fort Valley, Ga., Jan. 3, and the shops together with an adjoining residence were burned. Loss $12,000.

The galvanized iron works of Biersach & Niedermeyer, Milwaukee, Wis., were damaged by fire to the extent of $5,000 Jan. 1.

In the recent fire at the plant of the John Inglis Co., Ltd., Toronto, Canada, the pattern loft and office were burned. This was a total loss, but does not impair the company's work in any way. It has been successful in securing an office in the Grant Hamilton Oil Co. building next door and is going on making up a new set of patterns as quickly as possible. The company manufactures boilers.

Fire in the office of the Highland Iron & Steel Co., Terre Haute, Ind., caused a loss of $3,000.

The plant of Lane & Roach, manufacturers of carriage and wagon machinery, at Syracuse, N. Y., was destroyed by fire Jan. 6, causing a loss of $114,000; insurance, $70,000.

Fire on the fifth and sixth floors of the six-story building at Lake and Franklin streets, Chicago, Jan. 8, caused a loss of $25,000. The two floors were occupied by the Kellogg-Mackay-Cameron Co., manufacturer of boilers, radiators and steam-fitters' supplies.

The foundry of the Alama Gasoline Engine Mfg. Co. at Hillsdale, Mich., burned Jan. 7, causing a large loss, covered by insurance.

New Construction:—

Chas. A. Lefferts & Co., manufacturers of iron columns and structural castings, Brooklyn, N. Y., will extend their plant so as to cover the entire site, 100 x 100 feet, to make more room for storing, cleaning and drilling columns as well as to give additional space in the foundry for small work. The officers of the company are: Chas. A. Lefferts, president; J. A. Concaneu, vice president; John J. Jung, secretary-treasurer.

The National Table Co., Owen Sound, Canada, whose plant was recently destroyed by fire, will rebuild at once.

J. R. McWane, of Richmond, Va., and other citizens of Lynchburg and Richmond are organizing a company to erect a steel casting plant at Birmingham, Ala. The capital will be $50,000 and the plant will be erected at a cost of about $25,000.

The plant of the Richmond Plow Co., Richmond, Ind., has been sold to the Brown-Manley Agricultural Co., at Malta, O.

The Harrell Stamp Mill Co., El Paso, Tex., recently incorporated, will erect a plant in the near future for the manufacture of stamp mills and crushers, and until the new plant is constructed its machines will be made by other companies.

The Putnam Machine Co., Fitchburg, Mass., is making extensive improvements to its plant, and is installing a traveling crane and other new equipment.

American Express Co., New York City, is building a repair shop 74 x 111 feet on 183d street, New York, at a cost of about $60,000. Considerable new machinery will be installed.

The Indiana State University, at Bloomington, Ind., will erect a power plant, 50 x 100 feet, at a cost of $20,000.

The Schubert Bros. Gear Co., Oneida, N. Y., will build a large addition to its plant.

The Motor Traction Co., Spokane, Wash., will build a plant in the spring for the manufacture of steam wagons.

The Birmingham Iron Foundry Co., Derby, Conn., has prepared for an increased business by a considerable outlay in new buildings and machinery. An addition 75 x 162 feet to the machine shop building has just been completed. It is an electrically equipped shop throughout, with two traveling cranes, and among new tools added are a Bond planer, 7 x 30 feet, a new 76-inch Bullard boring and turning mill, four heavy roll lathes and new grinding machinery.

The Simplex Railway Appliance Co. has finished a large addition to its plant at Hammond, Ind. It will be in full operation by Feb. 12.

The Wichita Bridge & Iron Co., Wichita, Kan., is making extensive improvements to its plant. The machine shop and foundry will be largely increased. There will be a 50-foot addition to the machine shop and the addition to the foundry will be 142 feet in length. A new boiler house will also be erected and new boilers which have already been received will be installed. For the past year the concern has averaged 100 men in its employ. When the improvements are made, nearly 500 will be employed.

The Brunk Machine & Forge Co., Lorain, O., is erecting a machine shop and forge at a cost of $10,000. Part of the machinery has been installed.

The Penn Shovel Co., Corry, Pa., whose plant was recently destroyed by fire, informs us that it will rebuild at once on a larger scale.

The Morning Star Mfg. Co., Napoleon, O., whose plant was recently destroyed by fire, advises us that it will begin at once to build a brick building 50 x 200 feet and a foundry disconnected, 50 x 60 feet, and that it will purchase machinery and resume operations at the very earliest time possible in order to turn out threshing machines for the coming season.

The Glasgow Iron Co., Pottstown, Pa., whose plate mill was recently destroyed by fire, advises us that it will rebuild on original lines.

Adam's Steel & Wire Works, Joliet, Ill., whose plant was recently destroyed by fire, advises us that the plant will not be rebuilt for about two months, and that the proprietor, W. J.

Adam, is not able at present to state what his requirements will be.

The Pittsburg and Valley Districts:

The Republic Engineering Co., of Pittsburg, Pa., which has been operating the plant of the Diescher Coupler Co. for some time, has been incorporated under the laws of the State of Pennsylvania with $25,000 capital. The incorporators of the company are Samuel E. Diescher, James E. McNary, C. C. Kennedy, F. E. Russell and W. G. McNary. In addition to manufacturing this patented coupler the company manufactures special machinery of all kinds.

The Westinghouse Machine Co., of Pittsburg, Pa., has delivered to the city of Philadelphia nine Westinghouse gas engines of 24,000 h. p. capacity for use in a new pumping station recently completed, and which is an innovation in the present methods of fighting fires. This pumping station is to dispense almost entirely with engines for pumping water at fires, as it will be able to deliver water to any part of the city at a pressure of 300 pounds. A stream carrying 10,500 gallons per minute can be thrown to the top of any of the city's buildings with this pressure.

The new additions to the armor plate department of the Homestead plant of the Carnegie Steel Co., Homestead, Pa., will be placed in operation the latter part of this month. The additions include a machine shop, new reheating furnace, press shop and the largest armor plate press in the world.

The Steel Car Forge Co., Elwood City, Pa., resumed operations last week after an extended idleness.

Notices were posted at the Homestead plant of the Carnegie Steel Co. last week, that in the future time and a half allowance for overtime would be abolished.

Owing to the blowing out of a cylinder head of engine No. 2, at the Shenango plant of the American Sheet & Tinplate Co., New Castle, Pa., mills 11 to 21 were compelled to shut down last week. This week mills 21 to 30 were placed in operation, and they will continue to run full until repairs can be made to the disabled engine. For several months 20 of the 30 mills of this plant have been in operation. The Sharon, Pa., tin plate mill resumed operations in full this week. Only 10 of the 20 mills have been on since last September. The 10 in operation were shut down on Dec. 24.

The blooming mill of the South Sharon, Pa., plant of the Carnegie Steel Co., resumed operations this week after an idleness of nearly three months. The will will, however, not continue in full operation for any length of time, as several thousand tons of ingots on the ground will be worked up, after which the mill will again be shut down. The future operation of this mill will depend entirely upon market conditions.

General Industrial Notes:—

The Warren Steam Pump Works, Warren, Mass., have purchased the equipment of the Slater Engine Co. of that city, which recently became bankrupt.

The Safety Nut Lock Co., Newark, N. J., recently incorporated, will manufacture a safety nut lock patented by Lewis D. Frenot of Newark. The company is not yet ready to announce its further plans.

The United States Cast Iron Pipe & Foundry Co.'s plant at Bessemer, Ala., which was closed Dec. 23, resumed operations Jan. 4. Extensive repairs have been made.

The Brown Corliss Engine Co., Corliss, Wis., has received an order from the Passaic Steel Co., of Paterson, N. J., for a 24 and 44 x 36-inch tandem rolling mill engine.

The Heald Machine Co., Worcester, Mass., since moving its business from Barre to Worcester, has been favored with exceptionally good trade in almost all lines and has just made shipment of a lot of drill grinders to Charles Churchill & Co., London; Fenwick, Freres & Co., Paris, France; one drill grinder for the Nippon Railway Co., of Japan, besides a lot of small tools to various domestic points, among its customers being the Watervliet Arsenal, Troy, N. Y., and the Frankford Arsenal, Philadelphia, Pa.

The wire mill of the Colorado Fuel & Iron Co., Pueblo, Col., started last week and the rod mill, blooming mill and open-hearth department are expected to resume this week.

The Shenango Bessemer plant of the Carnegie Steel Co., at New Castle, Pa., will resume operations Jan. 15, after being closed down about three months. Extensive improvements have been made.

The plant of the Fairfax Co., Marietta, O., has been taken over by a new concern, the Standard Supply Co., which will transform it into a foundry for the manufacture of foundry facings and supplies. The new firm expects to begin operations about the middle of the month.

The Eclipse Mill & Mfg. Co., Birmingham, Ala., has let the contract for its plant, and expects to have it in operation about March 1.

The Steel Car Forge Co. has resumed operations at its plant at Ellwood City, Pa., after being closed two months.

The Geo. B. Bennett Co., Youngstown, O., has purchased from the Reade Machinery Co., Cleveland, its patterns and drawings for a line of punching and shearing machinery, and will hereafter manufacture and sell the product direct to the trade. The Sennett Co. formerly built the machinery for the Reade Co.

The Ellwood Foundry Co., Ellwood, Pa., whose plant has been closed for some time, will shortly resume.

The American Plow Co., recently incorporated with a capital of $200,000, at Madison, Wis., has commenced operations. The plant has a capacity of 100 plows daily.

The business office of the Chateaugay Ore & Iron Co. has been moved from Plattsburg, N. Y., to Lyon Mountain, N. Y. The removal comes as a result of the taking over of the Delaware & Hudson Co. of the management of the Chateaugay railroad. The interests of the iron company are now nearly all at Lyon Mountain and vicinity.

The large stove foundry of the Wehrie Co., Newark, O., is now in partial operation.

Ninety iron workers reported Jan. 7 to the bureau of construction and repairs at the Charlestown Navy Yard, for work on the training ship Cumberland, which is under construction at the yard, being the first steel ship to be built there since the civil war.

The Pennsylvania Steel Co. and the Cambria Steel Co. have a large number of orders on hand. The Cambria Steel Co. will declare on Jan. 20 its regular semi-annual dividend of 1½ percent. The Pennsylvania Co.'s contract for the Blackwell's Island Bridge at New York and its contract with the Government for $500,000 worth of steel for the new bridge across the Potomac at Washington are two of the important contracts. The steel which it is to furnish the Wabash railroad at Pittsburg will amount to nearly $1,000,000. This contract is for the structural work on the new station, its approaches and bridges along the new line.

The plant of the Baltimore Rolling Mill Co., Canton, Md., which had been idle three weeks pending an adjustment of the affairs of the company by receivers recently appointed, resumed operations Jan. 11. The company employs about 200 men.

Nearly 300 employes are thrown out of work by the shutdown of the Pickering Spring Co., Ltd., Philadelphia. A large number of them may be taken on by the Charles Scott Spring Co. It is understood that the Pickering plant will be abandoned and work centered at the Scott plant. Both concerns are constituent companies of the Railway Steel Spring Co.

About 1,800 employes of the Illinois Steel Co. at South Chicago, thrown out of employment by the closing down of the mills before the holidays, returned to work Jan. 11. These include bricklayers, carpenters, electrical workers, machinists, blacksmiths and general repair gangs who are to finish repairs so that the plant will be ready to resume Jan. 18. A part of the plant has already resumed operation.

The plant of the Hopke Foundry Co., Rockford, Ill., has been entirely rebuilt and enlarged, and much improved machinery has been installed. The company makes a specialty of light gray iron castings, and a number of molding machines have been installed for the duplicate work. The melting capacity has been increased by the installation of a larger cupola and an electrically-driven blower. The J. S. McCormick Co., Pittsburg dealer in foundries' supplies, furnished all the equipment.

The Bates Machine Co. shops at Joliet, Ill., have resumed after being shut down for a month.

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There is no necessity for throwing away the condensation from your heating or drying system or closed heater simply because this condensed exhaust is contaminated with oil from the engine cylinder. A Cochrane Oil Separator will purify exhaust steam so thoroughly that this steam when condensed can be safely used for boiler feed.

It is well worth while to make this saving. The condensation from your closed heater alone will ordinarily amount to about one-seventh of all the water needed for your boilers, and whether your feed water costs you much or little the heat in this condensation is worth money — as much money as it would cost to generate the same amount of heat. Why should it be wasted? Then this condensation is worth saving because it is pure — because it contains no scale forming matter.

Nearly 4,000,000 H. P. of boilers are at present being protected by Cochrane Oil Separators from oil in the condensation of exhaust steam. That is pretty conclusive evidence of their merit. And aside from this, a study of the design of these "Cochranes" and of their principle of operation is sufficient to show **why** they are successfully giving this service. We, of course, guarantee the workmanship and materials used in their construction.

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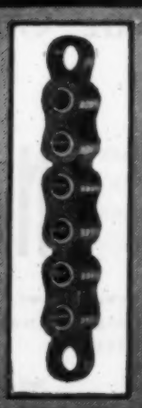

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